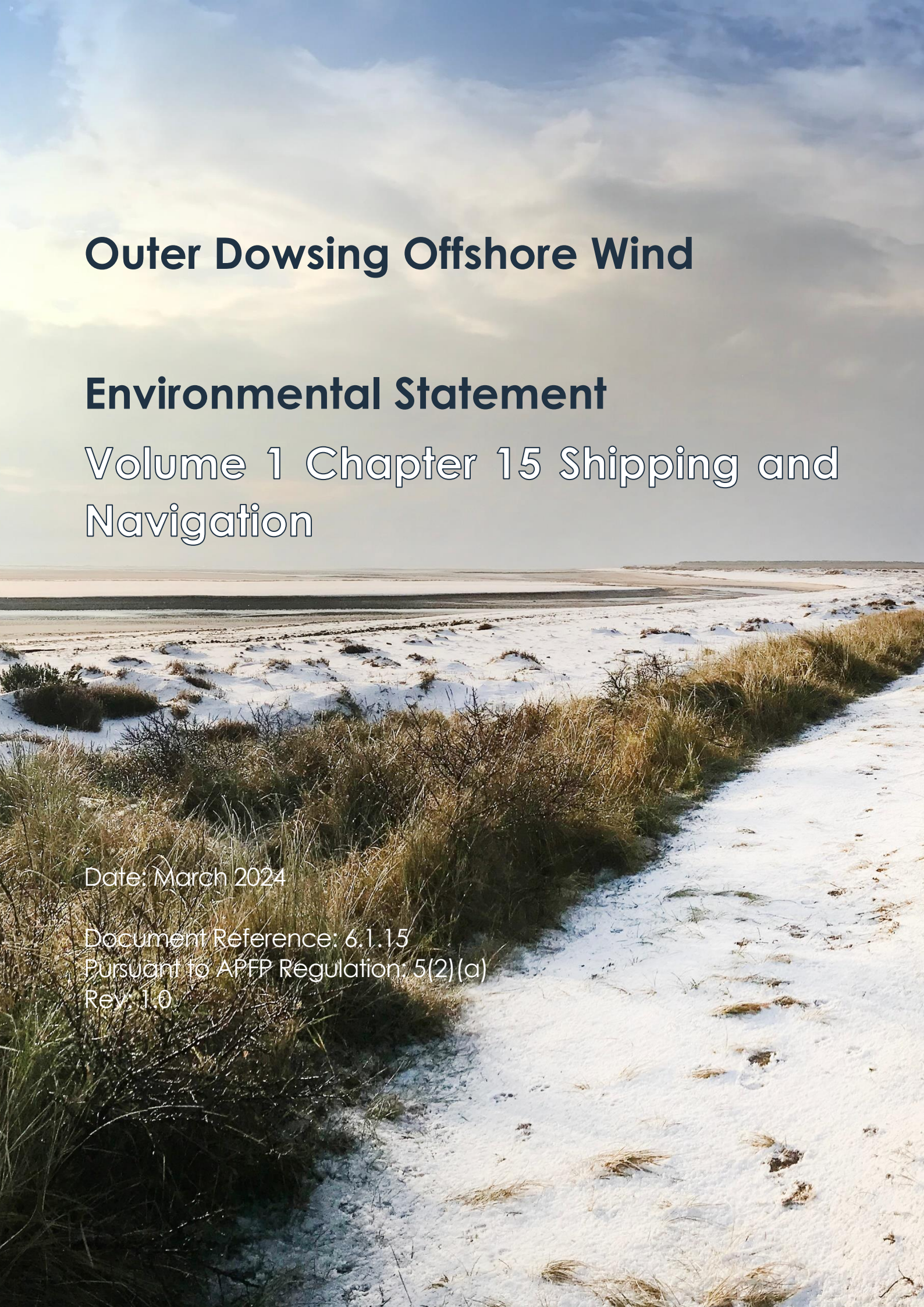
Outer Dowsing Offshore Wind

Environmental Statement

Volume 1 Chapter 15 Shipping and Navigation



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Acronyms & Definitions

Abbreviations / Acronyms

Abbreviation / Acronym	Description
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
AtoN	Aids to Navigation
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea
CoS	UK Chamber of Shipping
DCO	Development Consent Order
DESNZ	Department for Energy Security and Net Zero
DfT	Department for Transport
DLUHC	Department for Levelling Up, Housing and Communities
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
ERCoP	Emergency Response Cooperation Plan
ES	Environmental Statement
FSA	Formal Safety Assessment
GLA	General Lighthouse Authority
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	International Maritime Organisation
ITF	International Transport Forum
km	Kilometres
LOA	Length Overall
m	Metre
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MDS	Maximum Design Scenario
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
nm	Nautical Mile
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
OECD	Organisation for Economic Cooperation and Development
ORCP	Offshore Reactive Compensation Platform
OWF	Offshore Wind Farm
PADS	Principal Areas of Disagreement Statement
PEIR	Preliminary Environmental Information Report
PEXA	Practice and Exercise Areas

Abbreviation / Acronym	Description
PLL	Potential Loss of Life
Radar	Radio Detection and Ranging
RAM	Restricted in Ability to Manoeuvre
RNLI	Royal National Lifeboat Institution
RYA	Royal Yachting Association
SAR	Search and Rescue
SOLAS	Safety of Life at Sea
TCE	The Crown Estate
TSS	Traffic Separation Scheme
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UN	United Nations
UNCLOS	United Nations Convention of the Law of the Sea
WTG	Wind Turbine Generators

Terminology

Term	Definition
Adverse Weather Route	Preferred routes by certain vessels during periods of adverse weather conditions.
Array Area	The area within which the generating stations (including wind turbine generators (WTG) and inter array cables), offshore accommodation platforms, offshore transformer substations and associated cabling are positioned.
AfL arrary area	The area of the seabed awarded to GT R4 Ltd. through an Agreement for Lease (AfL) for the development of an offshore wind farm, as part of The Crown Estate's Offshore Wind Leasing Round 4.
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status. Most commercial vessels and European Union (EU)/UK fishing vessels over 15 m in length are required to carry AIS.
Allision	Contact between a vessel and a stationary object.
Baseline	The status of the environment at the time of assessment without the development in place.
Collision	Contact between two or more moving vessels.
Encounter	Two or more vessels passing in close proximity.
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the Environmental Impact Assessment (EIA) Regulations, including the publication of an Environmental Statement (ES).
Environmental Statement (ES)	The suite of documents that detail the processes and results of the EIA.
Formal Safety Assessment (FSA)	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity as defined by the International Maritime Organization (IMO).
Main Route	A route used on a regular basis by one or more vessels.

Term	Definition
Marine Guidance Note (MGN)	Guidance released by the Maritime and Coastguard Agency (MCA) for the purposes of providing advice relating to the improvement of the safety of shipping and of life at sea.
Maximum Design Scenario	The project design parameters, or a combination of project design parameters that are likely to result in the greatest potential for change in relation to each impact assessed
Offshore Export Cable Corridor (ECC)	The Offshore Export Cable Corridor (Offshore ECC) is the area within the Order Limits within which the export cables running from the array to landfall will be situated.
Offshore Reactive Compensation Station (ORCP)	A structure attached to the seabed by means of a foundation, with one or more decks and a helicopter platform (including bird deterrents) housing electrical reactors and switchgear for the purpose of the efficient transfer of power in the course of HVAC transmission by providing reactive compensation
ORCP Area	The area within which ORCPs will be placed.
ORCP Search Area	The original search area assessed at PEIR which has been refined to the ORCP area.
Offshore Substation (OSS)	A structure attached to the seabed by means of a foundation, with one or more decks and a helicopter platform (including bird deterrents), containing— (a) electrical equipment required to switch, transform, convert electricity generated at the wind turbine generators to a higher voltage and provide reactive power compensation; and (b) housing accommodation, storage, workshop auxiliary equipment, radar and facilities for operating, maintaining and controlling the substation or wind turbine generators
Outer Dowsing Offshore Wind (ODOW)	The Project.
Preliminary Environmental Information Report (PEIR)	The PEIR was written in the style of a draft Environmental Statement (ES) and provided information to support and inform the statutory consultation process during the pre-application phase.
Project Design envelope	A description of the range of possible elements that make up the Project's design options under consideration, as set out in detail in the project description. This envelope is used to define the Project for Environmental Impact Assessment (EIA) purposes when the exact engineering parameters are not yet known. This is also often referred to as the "Rochdale Envelope" approach.
Regular Operator	A commercial operator associated with one or more vessels that transit an area on a regular basis.
Safety Zone	An area around a structure associated with an Offshore Renewable Energy Installation where entry is prohibited under the Energy Act 2004.
The Applicant	GT R4 Ltd. The Applicant making the application for a DCO. The Applicant is GT R4 Limited (a joint venture between Corio Generation, TotalEnergies and Gulf Energy Development (GULF)), trading as Outer Dowsing Offshore Wind. The project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company), TotalEnergies and GULF.
The Project	Outer Dowsing Offshore Wind, an offshore wind generating station together with associated onshore and offshore infrastructure.
Wind turbine generator (WTG)	A structure comprising a tower, rotor with three blades connected at the hub, nacelle and ancillary electrical and other equipment which may include

Term	Definition
	J-tube(s), transition piece, access and rest platforms, access ladders, boat access systems, corrosion protection systems, fenders and maintenance equipment, helicopter landing facilities and other associated equipment, fixed to a foundation

15 Introduction

1. This chapter of the Environmental Statement (ES) presents the results of the Environmental Impact Assessment (EIA) process for the potential impacts of Outer Dowsing Offshore Wind ("the Project") on Shipping and Navigation. Specifically, this chapter considers the potential impact of the Project seaward of Mean High Water Springs (MHWS) during the construction, operation and maintenance, and decommissioning phases.
2. GT R4 Limited (trading as Outer Dowsing Offshore Wind) hereafter referred to as the 'Applicant', is proposing to develop the Project. The Project array will be located approximately 54km from the Lincolnshire coastline in the southern North Sea. The Project will include both offshore and onshore infrastructure including an offshore generating station (windfarm), export cables to landfall, Offshore Reactive Compensation Platforms (ORCPs), onshore cables, connection to the electricity transmission network, ancillary and associated development and areas for the delivery of up to two Artificial Nesting Structures (ANS) and the creation and recreation of a biogenic reef (if these compensation measures are deemed to be required by the Secretary of State) (see Volume 1, Chapter 3: Project Description (document reference 6.1.3) for full details).
3. This chapter summarises the information contained within Volume 3, Appendix 15.1 Navigational Risk Assessment (NRA) (document reference 6.3.15.1). This is a requirement of the relevant Maritime and Coastguard Agency (MCA) guidance, namely Marine Guidance Note (MGN) 654 (MCA, 2021) (see Section 15.1). Compliance with MGN 654 has been demonstrated via completion of an MGN 654 checklist which is included as an Annex to the NRA (document reference 6.3.15.1).
4. This chapter should be read alongside the following chapters and documents:
   - Volume 1, Chapter 14: Commercial Fisheries (document reference 6.1.14); and
   - Volume 1, Chapter 18: Infrastructure and Other Marine Users (document reference 6.1.18).

15.1 Statutory and Policy Context

5. The relevant legislation and planning policy for offshore renewable energy Nationally Significant Infrastructure Projects (NSIP), specifically in relation to shipping and navigation, is outlined in Table 15.1 below:

Table 15.1 Legislation and policy context

Legislation/policy	Key provisions	Section where comment addressed
United Nations Convention on the Law of the Sea (UNCLOS) (United Nations (UN), 1982)	UNCLOS defines the rights and responsibilities of all nations with respect to their use of the sea, throughout the world. Article 60(7) states "Artificial islands, installations and	Internationally recognised sea lanes and other identified routes are considered a key element of the shipping and navigation baseline and have been considered wherever "interference may be caused"

Legislation/policy	Key provisions	Section where comment addressed
	structures and the safety zones around them may not be established where interference may be caused to the use of recognised sea lanes essential to international navigation".	including through vessel displacement, port access, collision risk and allision risk in the impact assessment.
Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) (International Maritime Organisation (IMO), 1972/77) as implemented by the Merchant Shipping (Distress Signals and Prevention of Collisions) Regulations 1996.	The COLREGs define the rules which must be adhered to by all vessels navigating internationally. Rule 8 Part (a) states "Any action to avoid collision shall be taken in accordance with the Rules of this Part and shall, if the circumstances of the case admit, be positive, made in ample time and with due regard to the observance of good seamanship." Rule 19 Part (b) states "Every vessel shall proceed at a safe speed adapted to the prevailing circumstances and conditions of restricted visibility A power-driven vessel shall have her engines ready for immediate manoeuvre."	The COLREGs in full are considered throughout this chapter and the NRA (document reference 6.3.15.1) with particular regard in the context of the Project to collision avoidance (Rule 8) and conduct of vessels in restricted visibility (Rule 19) when considering collision risk in the impact assessment. The impact assessment (which includes consideration of COLREGs) is provided in Section 15.6.
The International Convention for the Safety of Life at Sea (SOLAS) Chapter V (IMO, 1974)	SOLAS Chapter V is an international agreement that sets basic minimum criteria for all seafarers, dependent on the size and type of vessel. Regulation 33 states "The master of a ship at sea which is in a position to be able to provide assistance on receiving a signal from any source that persons are in distress at sea, is bound to proceed with all speed to their assistance, …"	SOLAS Chapter V in full is considered throughout this chapter and the NRA (document reference 6.3.15.1) with particular regard in the context of the Project to rendering assistance to persons in distress (Regulation 33) and passage planning (Regulation 34) when considering allision risk, anchor interaction with sub-sea cables and emergency response capability. The impact assessment (which includes

Legislation/policy	Key provisions	Section where comment addressed
	Regulation 34 states "Prior to proceeding to sea, the master shall ensure that the intended voyage has been planned using the appropriate nautical charts and nautical publications for the area concerned, …".	consideration of SOLAS Chapter V) is provided in Section 15.6.
EN-3 National Policy Statement (NPS) for Renewable Energy Infrastructure (Department for Energy Security and Net Zero (DESNZ), 2023)	**Paragraph 2.8.179:** To ensure safety of shipping applicants should reduce risks to navigational safety to as low as reasonably practicable (ALARP).	ALARP principles have been applied to the impact assessment methodology in line with the Formal Safety Assessment (FSA) process prescribed in MGN 654 (see section 15.5).
	Paragraph 2.8.184: Applicants should engage with interested parties in the navigation sector early in the pre-application phase of the proposed offshore wind farm or offshore transmission to help identify mitigation measures to reduce navigational risk to ALARP, to facilitate proposed offshore wind development. This includes the Marine Management Organisation (MMO) or Natural Resources Wales (NRW) in Wales, MCA, the relevant General Lighthouse Authority (GLA), such as Trinity House, the relevant industry bodies (both national and local) and any representatives of recreational users of the sea, such as the Royal Yachting Association (RYA), who may be affected. This should continue throughout the life of the development including during the construction, operation and decommissioning phases.	Consultation with relevant stakeholders has been a key input to the impact assessment and included engagement with, and consideration of responses from the MCA, Trinity House, RYA, and MMO (see section 15.2).
	Paragraph 2.8.185: Engagement should seek solutions that allow	Consultation with relevant stakeholders has been a key

Legislation/policy	Key provisions	Section where comment addressed
	offshore wind farms, offshore transmission, and navigation and shipping users of the sea to co-exist successfully.	input to the NRA process (see section 15.2) with a view to ensuring suitable mitigations are implemented in agreement with stakeholders.
	Paragraph 2.8.186 The presence of the wind turbines can also have impacts on communication and shipborne and shore-based Radar systems.	Impacts relating to navigation, communication, and position fixing equipment have been considered in the NRA (document reference 6.3.15.1).
	Paragraph 2.8.187 Prior to undertaking assessments applicants should consider information on internationally recognised sea lanes, which is publicly available.	Main commercial routes – which are international in nature – have been identified (see section 15.3.3). There are no IMO routeing measures in proximity to the array area.
	Paragraph 2.8.188: Applicants should refer in assessments to any relevant, publicly available data available on the Maritime Database.	There is considered to be no relevant information on the Maritime Database outside of information already captured (see section 15.3.2).
	Paragraph 2.8.189 Applicants must undertake an NRA in accordance with relevant government guidance prepared in consultation with the MCA and the other navigation stakeholders listed above [Paragraph 2.8.184].	An NRA has been undertaken in line with MGN 654 and has been informed by consultation with shipping and navigation stakeholders (document reference 6.3.15.1).
	Paragraph 2.8.190 The NRA will for example necessitate: ▪ A survey of vessel traffic in the vicinity of the proposed wind farm; ▪ A full NRA of the likely impact of the wind farm on navigation in the immediate area of the wind farm in accordance with the relevant marine guidance; and ▪ Cumulative and in-combination risks associated with the	Vessel traffic surveys have been undertaken (see section 15.3.2). An NRA has been undertaken in line with MGN 654 (document reference 6.3.15.1). Cumulative assessment is provided in section 15.7.

Legislation/policy	Key provisions	Section where comment addressed
	development and other developments (including other wind farms) in the same area of sea.	
	Paragraph 2.8.191 to 2.8.194 In some circumstances applicants may seek declaration of a safety zone around wind turbines and other infrastructure. Although these might not be applied until after consent to the wind farm has been granted. Where there is a possibility that safety zones will be sought, applicant assessments should include potential effects on navigation and shipping. Where the precise extents of potential safety zones are unknown, a realistic worst-case scenario should be assessed. Applicants should consult the MCA for advice on maritime safety, and refer to the government guidance on safety zones as a part of this process.	Impacts associated with safety zones are assessed in section 15.6. Assumptions on safety zone dimensions are included in section 15.4.2.
	Paragraph 2.8.195 Applicants should undertake a detailed NRA, which includes Search and Rescue (SAR) Response Assessment and emergency response assessment prior to applying for consent. The specific SAR requirements will then be discussed and agreed post-consent.	Impacts on SAR have been assessed in section 15.6. There will be full MGN 654 compliance as per section 15.4.3.
	Paragraph 2.8.259 Mitigation measures will include site configuration, lighting and marking of projects to take account of any requirements of the GLA.	Lighting and marking will be agreed with the MCA, Trinity House, and the Civil Aviation Authority (CAA) as per section 2.4.3. Lighting and marking is secured by the generation and transmission DMLs at condition 8.

Legislation/policy	Key provisions	Section where comment addressed
		The layout will be agreed with MCA and Trinity House as per section 2.4.3 and submitted to the MMO for approval. The layout of the turbines is a detail that will form part of the design plan that is to be submitted under condition 13 of the dMLs.
	Paragraph 2.8.260 In some circumstances, the Secretary of State may wish to consider the potential to use requirements involving arbitration (between the applicant and third parties) as a means of resolving how adverse impacts on other commercial activities will be addressed.	The draft DCO provides for disputes to be settled by arbitration, unless otherwise expressly stated.
	Paragraph 2.8.326 to 2.8.330 The Secretary of State should not grant development consent in relation to the construction or extension of an offshore wind farm if it considers that interference with the use of recognised sea lanes essential to international navigation is likely to be caused by the development. The use of recognised sea lanes essential to international navigation means: a) anything that constitutes the use of such a sea lane for the purposes of article 60(7) of the United Nations Convention on the Law of the Sea 1982; and b) any use of waters in the territorial sea adjacent to Great Britain that would fall within paragraph (a) if the waters were in a REZ. The Secretary of State should be satisfied that the site selection has been made with a view to avoiding or minimising	Main commercial routes – which are international in nature – have been identified (see section 15.3.3) and assessed in section 15.6. There are no IMO routeing measures in proximity to the array area. Further details of site selection are provided in Volume 1, Chapter 4 Site Selection and Consideration of Alternatives (document reference 6.1.4).

Legislation/policy	Key provisions	Section where comment addressed
	disruption or economic loss to the shipping and navigation industries, with particular regard to approaches to ports and to strategic routes essential to regional, national and international trade, lifeline ferries and recreational users of the sea. Where after carrying out a site selection, a proposed development is likely adversely to affect major commercial navigation routes, for instance by causing appreciably longer transit times, the Secretary of State should give these adverse effects substantial weight in its decision making. Where a proposed offshore wind farm is likely to affect less strategically important shipping routes, the Secretary of State should take a pragmatic approach to considering proposals to minimise negative impacts.	
	Paragraph 2.8.331 The Secretary of State should be satisfied that risk to navigational safety is as low as reasonably practicable (ALARP). It is government policy that wind farms and all types of offshore transmission should not be consented where they would pose unacceptable risks to navigational safety after mitigation measures have been adopted.	ALARP principles have been applied to the impact assessment methodology in line with the FSA process prescribed in MGN 654 (see section 15.5).
	Paragraph 2.8.332 The Secretary of State should be satisfied that the scheme has been designed to minimise the effects on recreational craft and	Impacts on recreational vessels have been assessed in section 15.6.

Legislation/policy	Key provisions	Section where comment addressed
	that appropriate mitigation measures, such as buffer areas, are built into applications to allow for recreational use outside of commercial shipping routes.	
	Paragraph 2.8.335 The Secretary of State should have regard to the extent and nature of any obstruction of or danger to navigation which (without amounting to interference with the use of such sea lanes) is likely to be caused by the development in determining whether to grant consent for the construction, or extension, of an offshore wind farm, and what requirements to include in such a consent.	Associated impacts have been assessed in section 15.6.
National Policy Statement for Ports (Department of Transport (DfT), 2012)	The NPS for Ports sets out the framework for decisions on proposals for new port development.	Although not directly applicable to the Project, ports and port users are identified as potential receptors and therefore elements of the NPS are considered relevant.
	Paragraph 5.14.2 states "Where the project is likely to have socio-economic impacts at local or regional levels, the applicant should undertake and include in their application an assessment of these impacts as part of the ES, ..." Paragraph 5.14.4 states "Applicants should describe the existing socio-economic conditions in the areas surrounding the proposed development and should also refer to how the development's socio-economic impacts	The socio-economic effect of the Project on local ports has been considered in Volume 1, Chapter 29: Socio-economic Characteristics (document reference 6.1.29). Displacements impacts have been considered in Section 15.6.

Legislation/policy	Key provisions	Section where comment addressed
	correlate with local planning policies." Paragraph 5.14.5 states "Socio-economic impacts may be linked to other impacts."	
United Kingdom (UK) Marine Policy Statement (HM Government, 2011)	The UK Marine Policy Statement provides a framework for preparing Marine Plans and taking decisions affecting the marine environment. Paragraph 3.4.7 states "Increased competition for marine resources may affect the sea space available for the safe navigation of ships. Marine plan authorities and decision makers should take into account and seek to minimise any negative impacts on shipping activity, freedom of navigation and navigational safety and ensure that their decisions are in compliance with international maritime law".	Displacement of existing routes and activity and subsequent increases in collision risk has been considered. The impact assessment (which includes consideration of vessel displacement) is provided in Section 15.6.

15.2 Consultation

6. Consultation is a key part of the Development Consent Order (DCO) application process. Consultation regarding Shipping and Navigation has been conducted through dedicated meetings, the EIA scoping process (Outer Dowsing Offshore Wind, 2022), the Preliminary Environmental Information Report (PEIR) process (Outer Dowsing Offshore Wind, 2023), a regular operator outreach, and two hazard workshops. Full details of this output are available in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).
7. An overview of the Project's Technical Consultation (document reference 6.1.6) and wider consultation is presented in the Consultation Report (document reference 5.1).
8. As identified in Volume 1, Chapter 3: Project Description and Volume 1, Chapter 4: Site Selection and Alternatives, the Project design envelope has been refined throughout the stages of the Project prior to DCO submission. This process has been reliant on stakeholder consultation feedback.

9. Design amendments to the array area are of particular relevance to this chapter given the site boundaries within which surface piercing structures will be placed will impact vessel routeing post wind farm. The original array area included at PEIR is referred to as the Area for Lease array area ('AfL array area') hereafter, with the 'array area' referring to the final array area following amendment.
10. A reduction has also been made to the original Offshore Reactive Compensation Platform (ORCP) search area included at PEIR, with shipping and navigation again being a key factor. The amended area is hereafter referred to as the 'ORCP area'.
11. Full details of the consultation and background in relation to the array area and ORCP area are provided in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).

15.3 Baseline Environment

15.3.1 Study Area

12. The shipping and navigation study area has been defined as a minimum[1] 10 nautical mile (nm) buffer of the array area. The 10nm study area is considered standard for shipping and navigation assessment given it typically captures relevant routeing in the region while still remaining site specific. It has been used in the majority of UK Offshore Wind Farm (OWF) shipping and navigation assessments. Recent examples include Hornsea Project Three OWF, Hornsea Project Four OWF the Norfolk Vanguard OWF and the Norfolk Boreas OWF, all of which were awarded consent.
13. The offshore Export Cable Corridor (ECC) study area has been defined as a 2nm buffer of the offshore ECC. The ORCP area study area has been defined as a minimum[2] 10nm buffer of the ORCP area.
14. The study areas are presented in Figure 15.1 (document reference 6.2.15.1) in relation to the array area, offshore ECC, and ORCP area. It is noted that the study area approach has been presented to and agreed with the MCA, Trinity House and the UK Chamber of Shipping (CoS) during consultation (see Section 15.2).

[1] 10nm radius based on AfL array area boundary.
[2] 10nm radius based on the ORCP search area.

15.3.2 Data Sources

15. Baseline data collection has been undertaken to establish the shipping and navigation baseline within the study areas.

16. The main data sources used to characterise the shipping and navigation baseline relative to the Project are outlined in Table 15.2.

Table 15.2: Summary of Baseline Data Sources

Data Source	Date	Summary	Coverage of Study Area
Vessel traffic survey, summer and winter 2022	2 August – 15 August 2022	Summer vessel traffic survey data consisting of Automatic Identification System (AIS), Radar and visual observations for the shipping and navigation study area recorded from a dedicated survey vessel on-site for 14 full days.	Full coverage of shipping and navigation study area.
	15 November – 29 November 2022	Winter vessel traffic survey data consisting of AIS, Radar and visual observations for the shipping and navigation study area recorded from a dedicated survey vessel on-site for 14 full days.	Full coverage of shipping and navigation study area.
Vessel traffic survey, winter and summer 2023	9 January – 23 January 2023	Winter vessel traffic survey data consisting of AIS, Radar, and visual observations for the ORCP area study area recorded from a dedicated survey vessel on-site for 14 full days.	Full coverage of ORCP area study area.
	14 June – 28 June 2023	Summer vessel traffic survey data consisting of AIS, Radar, and visual observations for the ORCP area study area recorded from a dedicated survey vessel on-site for 14 full days.	Full coverage of ORCP area study area.
Anatec	2 August – 15 August 2022	Summer 14-day AIS data for the offshore ECC recorded from coastal receivers.	Full coverage of ECC study area.
Anatec	15 November – 29 November 2022	Winter 14-day AIS data for the offshore ECC recorded from coastal receivers.	Full coverage of ECC study area.
Anatec	1 April 2021 – 31 March 2022	12 Months AIS data for the shipping and navigation study area recorded from coastal receivers.	Full coverage of shipping and navigation study area.
Anatec	2023	ShipRoutes database.	Full coverage of shipping and navigation study area.

Data Source	Date	Summary	Coverage of Study Area
RYA	2019	RYA Coastal Atlas of Recreational Boating 2.1 (RYA, 2019 (b)).	Full coverage of study areas.
Marine Accident Investigation Branch (MAIB)	2002-2021	Maritime incident data including the locations and details of all MAIB reported incidents.	Full coverage of study areas.
Royal National Lifeboat Institution (RNLI)	2003-2022	Maritime incident data including the locations and details of all RNLI reported incidents.	Full coverage of study areas.
DfT	2015-2023	Maritime incident data including the locations and details of all UK civilian SAR helicopter taskings.	Full coverage of study areas.
The Crown Estate (TCE)	2023	Marine aggregate dredging areas (licenced and active).	Full coverage of study areas.
United Kingdom Hydrographic Office (UKHO)	2023	Admiralty Charts 1187, 1190, and 1503, and historical mapping.	Full coverage of study areas.
UKHO	2021	*Admiralty Sailing Directions NP54 North Sea (West) Pilot*	Full coverage of study areas.

15.3.3 Existing Environment

17. This section describes the present conditions which constitute the existing baseline environment for shipping and navigation within the offshore study area.

15.3.3.1 Navigational Features

18. A plot of the key navigational features within, and in proximity to, the array area are presented in Figure 15.2 (document reference 6.2.15.1). Further details are provided in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1), which provides full assessment of all features identified.
19. The key navigational features identified within, and in proximity to, the array area are then summarised in Table 15.3.

Table 15.3: Summary of Navigational Features

Navigational Feature	Details
Other operational OWFs s	Triton Knoll OWF lies approximately 4nm west of the array area, and was fully commissioned and operational in January 2022. Other operational wind farms in proximity to the array area and offshore ECC include: ▪ Dudgeon, approximately 7nm south of the offshore ECC ▪ Hornsea Project One, approximately 11.6nm northeast of the array area ▪ Hornsea Project Two, approximately 9nm northeast of the array area ▪ Race Bank and Inner Dowsing bordering the south of the offshore ECC.
IMO routeing measures	There are no IMO Routeing measures in proximity to the array area or offshore ECC. However, the Inner Approaches Traffic Separation Scheme (TSS) consisting of three outer TSSs from a NE, E, and SE direction merging into a TSS into the Humber is located 22nm to the west of the array area, and approximately 12nm northwest of the ORCP area. Certain main routes identified in the study areas use this TSS.
Aids to Navigation (AtoN)	An AtoN is situated at the western extent of the array area, between Outer Dowsing Shoal and Pickerill gas field. Other key AtoN to the array area include the Northern Outer Dowsing Light Buoy, a north cardinal mark located approximately 1nm to the northwest of the array area above the Outer Dowsing Shoal; the Mid Outer Dowsing Light Buoy, a lateral mark west of the Outer Dowsing Shoal approximately 4nm to the south west; the East Dudgeon Light Buoy.
Marine aggregate dredging areas	There are several marine aggregate dredging areas defined by TCE in proximity to the Project. The key areas include Outer Dowsing areas 515/1, 6nm to south west of array area, and 515/2, immediately south west. The Inner Dowsing exploration and option area 1805 intersects the offshore ECC approximately 6nm offshore.
Ports and Harbours	Although not shown in Figure 15.2 (document reference 6.2.15.1), there are several ports and harbours in the proximity to the Project. The closest to the array area is Wells Harbour approximately 32nm to the south west of the array area on the Norfolk coast. Wells Harbour is described by Admiralty Sailing Directions as a "*small port for fishing and recreational craft"* (UKHO, 2021) and so the closest commercial port or harbour is the Port of Immingham, approximately 38nm to the west at the entrance to the Humber.
Pilot boarding stations	Four pilot boarding stations are present within the Humber competent harbour area 25nm to the west of the array area.
Oil and gas features	Oil and gas structures within the array include the partially decommissioned Pickerill Gas Field and its two offshore platforms Pickerill A and B, the pending decommissioning Galahad Gas Field and

Navigational Feature	Details
	its Galahad platform[3], and the operational Malory Gas Field and its Malory platform. Three wells are present within the array area. Barque PB Platform is positioned 0.7nm to the immediate east of the array area.
ORCP	Two ORCPs are situated approximately 5nm to the north west of the array area and are associated with Hornsea Project One and Hornsea Project Two.
Spoil grounds	There are two areas of spoil ground in close proximity to the offshore ECC. One area of spoil ground intersects the Offshore ECC approximately 6nm from the coast. Another area, although disused, is present 1.4nm south of the offshore ECC. A spoil ground is also located 12nm north of the array area.
Anchorage areas	The only designated anchorage area located in the wider region is the Humber Deep Water Anchorage located approximately 18.5nm west of the array area.
Military Practice and Exercise Areas (PEXA)	Donna Nook firing practice area is located north of the offshore ECC at the south of the Humber entrance. There are no restrictions placed on the right to transit a military PEXA at any time although mariners are advised to exercise caution. Exercises and firing only occur when the area is considered to be clear of all shipping.
Subsea cables	There are a number of subsea cables in proximity to the Project including the export cables for Hornsea Project One and Two which make landfall on the Yorkshire Coast.
Subsea pipelines	There are several charted pipelines in proximity to the Project from offshore subsea assets to shore (including pipeline bundles), noting that pipelines between assets are also present within the array area. These include decommissioned pipelines and pipelines that are planned to be decommissioned.
Charted wrecks	There are five charted wrecks within the array area and eight within the offshore ECC.
Shallow banks	The shallow banks within the wider area are referenced in Figure 15.2 by 10m contours and are of key relevance to shipping and navigation. Of note is the Outer Dowsing Shoal which intersects the western extent of the array area.

15.3.3.2 Vessel Traffic

Array Area

[3] Galahad platform is expected to be decommissioned before 2025 and is already carbon free.

20. A plot of vessel traffic recorded via AIS, Radar and visual observation over 14 full days between 2 August and 15 August 2022 (summer) within the shipping and navigation study area is presented in Figure 15.3 (document reference 6.2.15.1) colour-coded by vessel type.
21. Following this, a plot of vessel traffic recorded via AIS, Radar and visual observation over 14 full days between 15 November and 29 November 2022 (winter) within the shipping and navigation study area is presented in Figure 15.4 (document reference 6.2.15.1) colour-coded by vessel type.
22. Additionally, 12 months of AIS data (April 2021-March 2022) is presented in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).

23. Throughout the summer survey, approximately 99% of vessel tracks were recorded via AIS with the remaining 1% recorded via Radar. There was an average of between 64 and 65 unique vessels per day recorded within the shipping and navigation study area. An average of eight unique vessels per day were recorded intersecting the array area.
24. Throughout the winter survey, approximately 97% of vessel tracks were recorded via AIS with the remaining 3% recorded via Radar. There was an average of 58 unique vessels per day recorded within the shipping and navigation study area. An average of seven unique vessels per day were recorded intersecting the array area.
25. The main vessel types recorded within the shipping and navigation study area during the summer survey period were cargo vessels (43% of all traffic), tankers (17%) and oil and gas vessels (14%). During the winter survey period the main vessel types were also cargo vessels (46%), tankers (21%), and oil and gas vessels (15%).
26. Length overall (LOA) was available for <99% of vessels recorded throughout both survey periods. The average length of vessels during the summer and winter survey periods were 111 metres (m) and 122m, respectively. The longest vessel recorded transiting through the shipping and navigation study area during the summer survey period was a passenger cruise liner measuring at 296m routeing to Rotterdam, The Netherlands. The longest vessel recorded during the winter survey period was a bulk carrier measuring at 250m routeing to Glensanda, UK.
27. Vessel draught was available for approximately 91% of vessels recorded throughout the summer survey period and 94% of all vessels recorded through the winter survey period. The average vessel draught was 5.2m and 5.7m for summer and winter, respectively.
28. Main commercial routes have been identified using the principles set out in MGN 654 (MCA, 2021). Vessel traffic data is assessed and vessels transiting at similar headings and locations are identified as a main route and can consist of multiple vessels or a single vessel making the same transit regularly. A total of 13 main commercial routes were identified within the shipping and navigation study area from the vessel traffic survey data and consultation, with full details provided in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).
29. Details of each of the main routes identified in the shipping and navigation study area including the average number of vessels per day, main destination ports and main vessel types are provided in Table 15.4. It is noted that the main route destination ports reflect the most frequently broadcast destinations via AIS on each route and vessels on any particular route may not be transiting between the ports specified. Further, the main routes reflect key directions of vessel traffic routeing within the shipping and navigation study area; there are additional commercial vessel movements operating outside of these routes.

Table 15.4: Description of Main Commercial Routes (Array Area)

Route No.	Average Vessels per Day	Description
1	16	**Humber Ports – Rotterdam (The Netherlands).** Primarily cargo vessels (59%) and tankers (29%). Includes P&O Ferries and Stena Line commercial ferry routes.
2	12	**Tees – Rotterdam (The Netherlands).** Primarily cargo vessels (53%) and tankers (34%). Used by DFDS Seaways commercial ferry operator (on the Newcastle-Amsterdam route) as an adverse weather route.
3	4	**Humber Ports – Cuxhaven (Germany).** Primarily cargo vessels (88%). Used by DFDS Seaways commercial ferry operator (on Immingham-Cuxhaven route).
4	2	**Tees Port – Rotterdam (The Netherlands).** Primarily cargo vessels (68%).
5	2	**Newcastle – Amsterdam (The Netherlands).** Primarily passenger vessels (79%). Used by DFDS Seaways commercial ferry operator (on the Newcastle-Amsterdam and Newcastle/North Shields-IJmuiden routes).
6	2	**Tees – Rotterdam (The Netherlands).** Primarily cargo vessels (49%) and tankers (41%).
7	1	**Humber Ports – Cuxhaven (Germany).** Primarily cargo vessels (88%).
8	1	**Tees Port – Rotterdam (The Netherlands).** Primarily cargo vessels (90%).
9	<1	**Humber Ports – Bremerhaven/Hamburg (Germany).** Primarily cargo vessels (90%).
10	<1	**Humber Ports – Cuxhaven (Germany).** Primarily cargo vessels (81%).
11	<1	**Humber Ports – Rotterdam (The Netherlands).** Primarily tankers (81%).
12	<1	**Tees – Amsterdam (The Netherlands).** Cargo vessels (35%), tankers (25%), passenger vessels (19%), and oil and gas vessels (19%). Used by DFDS Seaways commercial ferry operator (the Newcastle-Amsterdam route) as an adverse weather route.
13	<1	**Humber Ports – Hornsea OWFs.** Route used by construction, operation and maintenance vessels to the Hornsea offshore wind projects from the Humber.

30. Oil and gas vessels were recorded both in transit and also engaged in activities within the shipping and navigation study area with an average of nine unique oil and gas vessels per day recorded during both summer and winter survey periods. Oil and gas fields in the area which had high levels of activity include Clipper, Barque, Galleon, Amethyst, and West Sole. Great Yarmouth, UK, was the most common destination for vessels on transit during both survey periods.

31. Fishing vessels were mainly recorded to the north and within the array area, with an average of two unique vessels per day within the shipping and navigation study area during both summer and winter survey periods. This included both vessels engaged in fishing (i.e., gear may have been deployed) and in transit. Vessel activity within the array area was greater during the winter.
32. For the purposes of the shipping and navigation assessment, recreational vessels are considered to be those between 2.4m and 24m LOA, including sailing and motor craft and those involving in racing, recreational diving and recreational sea fishing. Throughout the summer survey period an average of one unique recreational vessel per day was recorded within the shipping and navigation study area with approximately 85% of recreational vessel tracks recorded via AIS and the remaining 15% recorded via Radar. No recreational vessels were recorded during the winter survey period, but this is expected given the distance offshore and the time of year the survey was carried out.
33. Marine aggregate dredgers were noted carrying out dredging activity at the two TCE aggregate dredging areas (Outer Dowsing 515/1 and 515/2) located to the southwest of the array area during both summer and winter survey periods. Less than one unique aggregate dredger was recorded per day within the shipping and navigation study area during the summer survey period with an average of one unique aggregate dredger recorded per day during the winter survey period.
34. No vessels were deemed to be at anchor during the two survey periods within the shipping and navigation study area.

Offshore Export Cable Corridor

35. Full details of the vessel traffic assessment undertaken for the Offshore ECC are provided in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).
36. Throughout the summer survey period, there was an average of 58 unique vessels per day recorded within the offshore ECC study area and an average of 55 unique vessels per day recorded intersecting the offshore ECC (equating to 95% of all traffic in the offshore ECC study area).
37. Throughout the winter survey period, there was an average of 60 unique vessels per day recorded within the offshore ECC study area and an average of 57 unique vessels per day recorded intersecting the offshore ECC (again equating to 95% of all traffic in the offshore ECC study area).
38. The main vessel types recorded within the offshore ECC study area during the summer survey period were cargo vessels (50%), tankers (16%), and wind farm vessels (14%). The main vessel types recorded within the offshore ECC study area during the winter survey period were cargo vessels (58%), tankers (18%), and oil and gas vessels (9%).

39. LOA was available for >99% of vessels recorded throughout the summer survey period. The average length of vessels was 99m with the longest vessel recorded transiting through the offshore ECC study area being a Ro-Ro measuring at 238m travelling to Immingham, UK. Vessel draught was available for approximately 89% of vessels recorded throughout the summer survey period. The average vessel draught was 4.6m. LOA was also available for >99% of vessels recorded throughout the winter survey period. The average length of vessels was 109m with the longest vessel recorded transiting through the offshore ECC study area being the 238m-long Ro-Ro. Vessel draught was available for approximately 96% of vessels recorded throughout the winter survey period. The average vessel draught was 5.1m.
40. One unique tanker and one wind farm support vessel were recorded at anchor within the offshore ECC study area during the summer survey period. The tanker spent a total of seven-days at anchor whilst the wind farm support vessel was anchored for a total of three-days. Three tankers and two cargo vessels were recorded at anchor within the within the offshore ECC study area during the winter survey period.

Offshore Reactive Compensation Platform

41. Full details of the vessel traffic assessment undertaken for the ORCP area are provided in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).
42. Throughout the winter survey period, there was an average of 44 unique vessels per day recorded within the ORCP area study area and an average of one unique vessel every two days recorded intersecting the ORCP area (equating to 1% of all traffic in the ORCP area study area). Throughout the summer survey period, there was an average of 47 unique vessels per day recorded within the ORCP area study area and an average of one unique vessel every five days recorded intersecting the ORCP area (equating to <1% of all traffic in the ORCP area study area).
43. The main vessel types recorded within the ORCP area study area during the winter survey period were cargo vessels (66%), tankers (12%), and wind farm vessels (9%). The main vessel types recorded within the ORCP area study area during the summer survey period were cargo vessels (50%), tankers (20%), and tankers (11%).
44. LOA was available for >99% of vessels recorded throughout the winter survey period. The average length of vessels was 102m with the longest vessel recorded transiting through the ORCP area study area being two unique Ro-Ros measuring at 238m. Vessel draught was available for approximately 94% of vessels recorded throughout the winter survey period. The average vessel draught was 4.7m. LOA was available for 98% of vessels recorded throughout the summer survey period. The average length of vessels was 92m with the longest vessel recorded transiting through the ORCP area study area being the two 238m-long Ro-Ros. Vessel draught was available for approximately 91% of vessels recorded throughout the summer survey period. The average vessel draught was 4.2m.

45. Six unique cargo vessels and four unique tankers were recorded at anchor within the ORCP area study area during the winter survey period. Most of these vessels at anchor were positioned at the north-west of the ORCP area study area and were likely waiting berth at Humber ports as implied by their AIS broadcast destinations. Five unique vessels were identified as at anchor within the ORCP area study area during the summer survey period, including two dredgers identified as anchored north of the ORCP area, a tanker identified to the northwest (anchored on two separate occasions), and a tug and wind farm vessel noted close to the coast.

46. Main commercial routes in proximity to the ORCP area have been identified using the principles set out in MGN 654 (MCA, 2021). A total of nine main commercial routes were identified within the ORCP area study area from the vessel traffic survey data and consultation, with full details provided in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).

47. Details of each of the main routes including the average number of vessels per day, main destination ports and main vessel types are provided in Table 15.5.

Table 15.5Description of Main Commercial Routes (ORCP)

Route No.	Average Vessels per Day	Description
1	10	**Humber Ports – Rotterdam**. Cargo vessels (62%), tankers (22%), and passenger vessels (15%). Includes the Killingholme – Zeebrugge and Killingholme – Rotterdam CLdN, as well as the Immingham – Cuxhaven and Immingham - Vlaardingen DFDS Seaways Ro-Ro routes; as well as the Killingholme – Hoek Van Holland StenaLine and Hull – Rotterdam P&O Ferries RoPax routes.
2	7-8	**Grimsby (UK) – Lincs, Inner Dowsing, and Lynn OWFs**. Entirely wind farm vessels (100%).
3	7	**Humber Ports – Amsterdam**. Primarily cargo vessels (91%). Includes alternate pathing for the Killingholme – Rotterdam CLdN, and Immingham – Vlaardingen DFDS Seaways Ro-Ro routes; as well as the Killingholme – Hoek Van Holland StenaLine and Hull – Rotterdam P&O Ferries RoPax routes.
4	3	**Tees – Rotterdam**. Primarily cargo vessels (93%).
5	3	**Humber Ports – Moerdijk**. Primarily cargo vessels (84%).
6	1-2	**Humber Ports – Rotterdam**. Cargo vessels (75%) and tankers (20%).
7	1	**Boston (UK) – Amsterdam**. Primarily cargo vessels (97%).
8	1	**Grimsby (UK) – Race Bank OWF**. Entirely wind farm vessels (100%).
9	1	**Boston – Dutch Ports**. Primarily cargo vessels (94%).

48. Cargo vessels were noted routeing in the deeper waters to the east and avoiding the shallow banks surrounding the ORCP area as well as routeing around the pre-existing OWFs.

49. The regular cargo vessels operating within the ORCP area study area included Ro-Ro vessels operated by DFDS Seaways, CLdN, Eckero Shipping, and Sea Cargo. CLdN vessels were on routes Killingholme (UK) – Zeebrugge (Belgium) as well as Killingholme (UK) – Rotterdam (the Netherlands). DFDS Seaways vessels were on routes Immingham (UK) – Cuxhaven (Germany) and Immingham (UK) – Vlaardingen (the Netherlands). No Ro-Ro vessel or route passed within the ORCP area with all vessels noted to the east and north-east of the sites.
50. Three unique instances of tankers anchoring in the shallower waters to the west of the ORCP area, between the banks, was noted by two unique vessels. These vessels were routeing to Immingham (UK) and passed to the immediate north of the ORCP area with some instances of intersecting the boundary corners before anchoring at the west. These vessels were discussed at the second hazard workshop, with general consensus being that the vessels were likely performing waiting manoeuvres.
51. RoPax vessels were operated by StenaLine and P&O Ferries. Roueting of RoPax during the winter period was noted between Killingholme (UK) – Hoek Van Holland (the Netherlands) for StenaLine vessels, and Hull (UK) – Rotterdam (the Netherlands) for P&O Ferries.
52. Wind farm vessels were mostly associated with the Lincs, Lynn and Inner Dowsing OWFs in the south-west of the study area. Several vessels were also noted attending Race Bank OWF at the eastern extent of the ORCP area study area. Vessels routeing to/from OWFs were noted utilising Grimsby and Great Yarmouth ports.
53. Fishing vessels were primarily recorded on transit, with vessels likely to be engaged in fishing activity based on speed and behaviour noted east of the ORCP area. No fishing vessels were recorded within the ORCP area.
54. Recreational vessels were not recorded during the winter survey period, with vessels noted primarily on northwest-southeast bearings following the coast during summer.

ANS

55. A high level vessel traffic assessment of 12 months of AIS data has been undertaken for the ANS Areas in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).
56. This assessment showed that busy vessel routeing passed north and south of the northern ANS area, with lower use routeing intersecting the northern area itself. A high density route was observed intersecting the southern ANS area. This route passes between the Broken Bank and Well Bank to the south.

15.3.3.3 Maritime Incidents

57. This section summarises assessment of maritime incident data studied in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).

Search and Rescue

58. The Bristow Group provide helicopter SAR operations in the UK and have been operating their service since April 2015. The closest SAR base to the Project is located at Humberside Airport, approximately 40nm from the array area. Data was produced by the DfT on civilian SAR helicopter activity in the UK by the Bristow Group on behalf of the MCA.

59. From SAR helicopter taskings data between 2015 and 2023 there was an average of six incidents per year within the shipping and navigation study, the majority of these being "Rescue/Recovery" (85%). Seven taskings took place within the array area itself.
60. There was an average of three incidents per year within the offshore ECC study area, the majority of these also being "Rescue/Recovery" (63%). Three taskings took place within the offshore ECC.
61. There was an average of four incidents per year within the ORCP area study area, with the majority being “Rescue/Recovery” (46%). One tasking took place within the ORCP area itself. The closest SAR helicopter base is located at Humberside Airport.

Royal National Lifeboat Institution

62. The relevant RNLI region for the Project is the East division with several RNLI stations situated in proximity to the Project, the closest being Mablethorpe approximately 29nm to the west of the array area.
63. From RNLI incident data recorded between 2013 and 2022 there was an average of one to two incidents per year within the shipping and navigation study area with one incident recorded within the array area. The most common incident types recorded were "Machinery Failure" (40%) and "Unspecified" (27%). The most common casualty types recorded were fishing vessels (27%) and powered recreational vessels (27%).
64. An average of six to seven incidents per year were recorded within the ECC study area with the majority occurring off the coast and six within the offshore ECC. The most common incident types recorded were "Person in Danger" (31%) and "Unspecified" (22%). The most common casualty types recorded were “Unspecified” (63%), “Person in danger” (17%) and "Powered Recreational" (14%).
65. An average of 32 incidents per year were recorded within the ORCP area study area with none recorded within the ORCP area itself. The most common incident types were “Unspecified” (55%), “Person in Danger” (25%), and “Machinery Failure” (7%). The most common casualty types were “Unspecified” (45%), “Person in Danger” (28%) and “Powered Recreational” (11%).
66. The most common RNLI base stations recorded for lifeboat launches for incidents in the ECC study area were Skegness (56%) and Mablethorpe (37%).

Marine Accident Investigation Branch Data

67. All UK flagged vessels and non-UK flagged vessels in UK territorial waters (12nm from coast), at a UK port or carrying passengers to a UK port are required to report accidents to the MAIB.
68. From MAIB incident data recorded between 2012 and 2021 there was on average two incidents per year within the shipping and navigation study area, with an average of one incident recorded every two years in the offshore ECC study area and one to two incidents per year within the ORCP area study area. Throughout the 10-year period, no incidents occurred within the array area, offshore ECC or ORCP area.

69. The most common incident types for the shipping and navigation study area were “Accident to Person” (37%) and “Machinery Failure” (37%), with the most frequent vessel types being service vessels (42%) and fishing vessels (32%).
70. The most common incident types for the offshore ECC study area were “Accident to Person” (40%) and “Flooding/Foundering” (40%), with the most frequent vessel types being service vessels (40%) and other commercial vessels (40%).
71. The most common incident types for the ORCP area study area were “Accident to Person” (29%) and “Collision” (29%), with the most frequent vessel types being other commercial vessels (35%), service vessels (24%) and fishing vessels (24%).
72. Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1) provides further details of a longer period of MAIB data (20 years in total).

15.3.3.4 Future Baseline

73. Future traffic levels are dependent on market conditions, and fluctuations are therefore difficult to predict, however the current accepted trend is that vessel size will increase, as per a study undertaken by the International Transport Forum (ITF) at the Organisation for Economic Cooperation and Development (OECD) on the impact of ‘Mega Ships’ (OECD/ITF, 2015). Regardless, Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1) considers future case traffic growth scenarios both with and without the Project of both 10% and 20%.
74. The installation of OWFs in the UK is set to continue and there are a number of projects at varying stages of development with further projects expected to meet the UK Government’s renewable energy targets. This is likely to mean that wind farm vessel volumes will increase in the North Sea. Further, in line with operational experience of other existing OWFs, third party commercial vessels are likely to deviate to avoid future wind farm developments, which may mean that vessel routeing changes in the area. However, no significant changes to certain key local routeing would be expected given it is largely dictated by the presence of shallow banks.
75. In terms of oil and gas, it should be considered that ongoing decommissioning of North Sea infrastructure means it is likely that platforms in the area will be removed, which may increase available searoom and therefore lead to changes in vessel routeing patterns. Number of oil and gas vessels may therefore also fluctuate.
76. Fishing vessel trends are discussed and considered further in Volume 1, Chapter 14: Commercial Fisheries (document reference 6.1.14).

15.4 Basis of Assessment

15.4.1 Scope of the Assessment

77. As detailed in the Scoping Report (Outer Dowsing Offshore Wind, 2022), no impacts were scoped out of the NRA process. Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1) has considered the established baseline and the assessment undertaken including at PEIR stage to identify which impacts scoped into the NRA require further assessment within the ES.

15.4.1.1 Impacts Scoped In for Assessments

78. The following impacts have been scoped into this assessment:

- Construction:
  - Impact 1: Displacement of vessels leading to increased collision risk between third-party vessels;
  - Impact 2: Restriction of adverse weather routeing;
  - Impact 3: Increased vessel-to-vessel collision risk between a third-party vessel and project vessel;
  - Impact 4: Increased vessel to structure allision risk (powered, drifting, and internal navigation);
  - Impact 5: Reduction of emergency response provision including SAR capability.
- Operation and maintenance:
  - Impact 1: Displacement of vessels leading to increased collision risk between third-party vessels;
  - Impact 2: Restriction of adverse weather routeing;
  - Impact 3: Increased vessel-to-vessel collision risk between a third-party vessel and project vessel;
  - Impact 4: Increased vessel to structure allision risk (powered, drifting, and internal navigation);
  - Impact 5: Reduction of emergency response provision including SAR capability;
  - Impact 6: Reduction of under keel clearance; and
  - Impact 7: Increased anchor/gear interaction with subsea cables.
- Decommissioning:
  - Impact 1: Displacement of vessels leading to increased collision risk between third-party vessels;
  - Impact 2: Restriction of adverse weather routeing;
  - Impact 3: Increased vessel-to-vessel collision risk between a third-party vessel and project vessel;
  - Impact 4: Increased vessel to structure allision risk (powered, drifting, and internal navigation);
  - Impact 5: Reduction of emergency response provision including SAR capability.

79. Impacts associated with Interference with marine navigation, communications, and position-fixing equipment have been assessed in Volume 3, Appendix 15.1: NRA.

15.4.1.2 Impacts Scoped out of Assessment

80. No impacts have been scoped out of the NRA process.

15.4.2 Realistic Worst Case Scenario

81. The following section identifies the Maximum Design Scenario (MDS) in environmental terms, defined by the Project design envelope.

Table 15.6 Maximum design scenario for shipping and navigation for the Project alone

Potential effect	Maximum design scenario assessed	Justification
Construction		
Impact 1: Displacement of vessels leading to increased collision risk between third-party vessels.	▪ Maximum extent of buoyed construction area assuming full build out of array area; ▪ 100 Wind Turbine Generators (WTG) and five offshore platforms in the array area; ▪ Two ORCPs located at the worst case locations set out in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1); ▪ Construction phase up to 4 years; and ▪ 500m safety zones around structures where active construction is ongoing, 50m safety zones otherwise.	Largest area over maximum period will lead to maximum displacement.
Impact 2: Restriction of adverse weather routeing.	▪ Maximum extent of buoyed construction area assuming full build out of array area; ▪ 100 WTGs and five offshore platforms in the array area; ▪ Two ORCPs located at the worst case locations set out in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1); ▪ Construction phase up to 4 years; and	Largest area over maximum period will lead to maximum potential for restriction of adverse weather routeing options.

Potential effect	Maximum design scenario assessed	Justification
	▪ 500m safety zones around structures where active construction is ongoing, 50m safety zones otherwise.	
Impact 3: Increased vessel-to-vessel collision risk between a third-party vessel and project vessel.	▪ Maximum extent of buoyed construction area assuming full build out of array area; ▪ 100 WTGs and five offshore platforms in the array area; ▪ Two ORCPs located at the worst case locations set out in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1); ▪ Up to 377.42km of array cables; ▪ Up to 123.75km of interlink cables; ▪ Up to 440km of export cables; ▪ Construction phase up to 4 years; and ▪ Up to 174 project vessels with a total of up to 5,234 return trips.	Maximum number of construction vessels will lead to maximum third party collision risk.
Impact 4: Increased vessel to structure allision risk (powered, drifting, and internal navigation).	▪ Maximum extent of buoyed construction area assuming full build out of array area; ▪ 100 WTGs (36x36m at sea level) and five offshore platforms in the array area (90x90m topsides); ▪ Two ORCPs located at the worst case locations set out in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1); ▪ Construction phase up to 4 years; and	Maximum number of structures will lead to maximum allision risk.

Potential effect	Maximum design scenario assessed	Justification
	▪ 500m safety zones around structures where active construction is ongoing, 50m safety zones otherwise.	
Impact 5: Reduction of emergency response provision including SAR capability.	▪ Maximum extent of buoyed construction area assuming full build out of array area; ▪ 100 WTGs and five offshore platforms in the array area; ▪ Two ORCPs located at the worst case locations set out in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1); ▪ Up to 377.42km of array cables; ▪ Up to 123.75km of interlink cables; ▪ Up to 440km of export cables; ▪ Construction phase up to 4 years; and ▪ Up to 174 project vessels with a total of up to 5,234 return trips.	Maximum number of construction vessels will lead to largest potential for increased incident rates.
Operation and Maintenance		
Impact 1: Displacement of vessels leading to increased collision risk between third-party vessels.	▪ Maximum extent (i.e., full build out) of array area; ▪ 100 WTGs and five offshore platforms in the array area; ▪ Two ORCPs located at the worst case locations set out in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1); ▪ Operational life up to 35 years; and	Largest area over maximum period will lead to maximum displacement.

Potential effect	Maximum design scenario assessed	Justification
	▪ 500m safety zones around structures where major maintenance is ongoing.	
Impact 2: Restriction of adverse weather routeing.	▪ Maximum extent (i.e., full build out) of array area; ▪ 100 WTGs and five offshore platforms in the array area; ▪ Two ORCPs located at the worst case locations set out in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1); ▪ Operational life up to 35 years; and ▪ 500m safety zones around structures where major maintenance is ongoing.	Largest area over maximum period will lead to maximum potential for restriction of adverse weather routeing options.
Impact 3: Increased vessel-to-vessel collision risk between a third-party vessel and project vessel.	▪ Maximum extent (i.e., full build out) of array area; ▪ 100 WTGs and five offshore platforms in the array area; ▪ Two ORCPs located at the worst case locations set out in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1); ▪ Up to 377.42km of array cables; ▪ Up to 123.75km of interlink cables; ▪ Up to 440km of export cables; ▪ Operational life up to 35 years; and ▪ Up to 36 project vessels with a total of up to 2,480 return trips.	Maximum number of project vessels will lead to maximum third party collision risk.

Potential effect	Maximum design scenario assessed	Justification
Impact 4: Increased vessel to structure allision risk (powered, drifting, and internal navigation).	▪ Maximum extent (i.e., full build out) of array area; ▪ 100 WTGs (36x36m at sea level) and five offshore platforms in the array area (90x90m topsides); ▪ Two ORCPs located at the worst case locations set out in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1) (90x90m topsides); ▪ Operational life up to 35 years; and ▪ 500m safety zones around structures where active construction is ongoing, 50m safety zones otherwise.	Maximum number of structures will lead to maximum allision risk.
Impact 5: Reduction of emergency response provision including SAR capability.	▪ Maximum extent (i.e., full build out) of array area; ▪ 100 WTGs and five offshore platforms in the array area; ▪ Two ORCPs located at the worst case locations set out in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1); ▪ Up to 377.42km of array cables; ▪ Up to 123.75km of interlink cables; ▪ Up to 440km of export cables; ▪ Operational life up to 35 years; and ▪ Up to 36 project vessels with a total of up to 2,480 return trips.	Maximum number of project vessels will lead to largest potential for increased incident rates.

Potential effect	Maximum design scenario assessed	Justification
Impact 6: Reduction of Under Keel Clearance.	▪ Maximum extent (i.e., full build out) of array area; ▪ 100 WTGs and five offshore platforms in the array area; ▪ Up to 377.42km of array cables, maximum height of rock berm of 1.5m, up to 22.75% of array cables requiring external protection; ▪ Up to 123.75km of interlink cables, maximum height of rock berm of 1.5m, up to 18.75% of interlink cables requiring external protection; ▪ Up to 440km of export cables, maximum height of rock berm of 1.5m, up to 23.2% of export cable requiring external protection within offshore ECC; and ▪ Operational life up to 35 years.	Maximum length of subsea cable and maximum extent of protection over longest period leading to maximum under keel interaction risk.
Impact 7: Increased anchor/gear interaction with subsea cables.	▪ Maximum extent (i.e., full build out) of array area; ▪ 100 WTGs and five offshore platforms in the array area; ▪ Up to 377.42km of array cables, maximum height of rock berm of 1.5m, up to 22.75% of array cables requiring external protection; ▪ Up to 123.75km of interlink cables, maximum height of rock berm of	Maximum length of subsea cable over longest period leading to maximum anchor/gear interaction risk.

Potential effect	Maximum design scenario assessed	Justification
	1.5m, up to 18.75% of interlink cables requiring external protection; ▪ Up to 440km of export cables, maximum height of rock berm of 1.5m, up to 23.2% of export cable requiring external protection within offshore ECC (including SAC); ▪ Minimum target burial depth of 1m; and ▪ Operational life up to 35 years.	
Decommissioning		
Analogous to construction phase.		

15.4.3 Embedded Mitigation

82. Mitigation measures that were identified and adopted as part of the evolution of the project design (embedded into the project design) or considered as industry standard for shipping and navigation and that are relevant to shipping and navigation are listed in Table 15.7. Details as to how these mitigations are included.

Table 15.7 Embedded mitigation relating to Shipping and Navigation

Description	Mitigation measures embedded into the project design	How Secured
Compliance with MGN 654	The Project will comply with MCA requirements as detailed within MGN 654 and its annexes.	dML conditions.
Charting	Project infrastructure (including structures and subsea cables) will be charted.	dML conditions require provision of relevant information to the UKHO.
Promulgation of information	Circulation of relevant project information including via all usual means (e.g., Kingfisher Bulletin, Notice/Notifications to Mariners).	dML conditions.
Buoyed construction area	Agreement of extent of buoyed construction area with Trinity House including buoy locations and types.	dML conditions.
Application for safety zones	Application for safety zones around structures during construction and periods of major maintenance: - 500m around structures where construction is ongoing; - 50m around all structures prior to commissioning of the Project; and - 500m around structures where major maintenance is ongoing.	Electricity application procedures (section 95 of Energy Act 2004).
Marine coordination	Marine coordination and communication to manage project vessel movements.	dML conditions.
Lighting and marking	Lighting and marking in agreement with Trinity House, MCA, and CAA, and in compliance with International Association of Marine Aids to Navigation and Lighthouse	dML conditions.

Description	Mitigation measures embedded into the project design	How Secured
	Authorities (IALA) G1162 (IALA, 2021).	
Guard vessels	Use of guard vessels where identified as necessary via Navigational Risk Assessment (Document 6.3.15.1)	Compliance with MGN 654
Layout design	Ongoing consultation with MCA and Trinity House in relation to layout design, including MCA and Trinity House sign off on final layout.	dML conditions.
Blade clearance	Blade clearance in line with RYA requirements (RYA, 2019 (a)) and MGN 654 to ensure potential for recreational mast interaction with the blades is minimised.	Compliance with MGN 654
Cable protection	Where possible, subsea cable burial will be the preferred option for cable protection. Cable burial will be informed by the cable burial risk assessment (CBRA) – which will take account of the presence of designated sites – and detailed within the Cable Specification and Installation Plan (CSIP). An outline CSIP has been prepared in support of the Application (document reference 8.5), which will be finalised post-consent.	dML conditions.

15.5 Assessment Methodology

83. The assessment of shipping and navigation impacts has been based on the FSA methodology noting this is the international standard for marine risk assessment, and is the approach required by the MCA under MGN 654, specifically Annex 1 (MCA, 2021).
84. The following sections describe the FSA methodology applied in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1) and this chapter.
85. The criteria for determining the significance of each impact are based on the severity of consequence and frequency of occurrence, as determined by Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1). The definitions for severity of consequence and frequency of occurrence in the NRA and this chapter are outlined in Table 15.8 and Table 15.9 respectively.

Table 15.8 Frequency of Occurrence

Frequency	Description
Frequent	Yearly
Reasonably probable	Once per 1-10 years
Remote	Once per 10-100 years
Extremely unlikely	Once per 100 to 10,000 years
Negligible	Less than once per 10,000 years

Table 15.9 Severity of Consequence

Severity	Description
Major	▪ Multiple fatalities to people; ▪ Total loss of property; ▪ Tier 3 environmental damage with national assistance required; and ▪ International reputational risk to business.
Serious	▪ Multiple serious injuries or single fatality to people; ▪ Damage to property resulting in critical risk to operations; ▪ Tier 2 environmental damage with regional assistance required; and ▪ National reputational risk to business.
Moderate	▪ Multiple minor or single serious injury to people; ▪ Damage to property not critical to operations; ▪ Tier 2 environmental damage with limited external assistance required; and ▪ Local reputational risk to business.
Minor	▪ Slight injury(s) to people; ▪ Minor damage to property, i.e., superficial damage; ▪ Tier 1 environmental damage with local assistance required; and ▪ Minor reputational risk to business limited to users.

Severity	Description
Negligible	No perceptible risk to people, property, the environment or business.

86. The significance of the impact upon shipping and navigation is then determined via a risk matrix as presented in Table 15.10. As shown, all impacts are determined to be either broadly acceptable, tolerable, or unacceptable based on the input frequency and consequence ranking.
87. For the purposes of the shipping and navigation assessment, impacts determined as being of Unacceptable significance are considered a 'significant' effect in terms of the EIA Regulations (2017). Impacts determined to be tolerable are not significant assuming the risks have been reduced to ALARP.
88. It is noted that Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1) uses FSA terminology as required under MGN 654 (MCA, 2021). In particular, use of the term "hazard" in the NRA is equivalent to "impact" within the EIA, and "risk" in the NRA is equivalent to "significance".

Table 15.10 Matrix to determine effect significance.

		Frequency of Occurrence				
		Negligible	*Extremely Unlikely*	*Remote*	*Reasonably Probable*	*Frequent*
Severity of Consequence	*Negligible*	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
	Minor	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Moderate	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Serious	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Major	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable

15.5.1 Assumptions and Limitations

89. The limitations associated with the vessel traffic survey data and other data sources are discussed in detail in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).
90. The shipping and navigation baseline and impact identification has been undertaken based upon the information available and responses received at the time of preparation. It has been assessed based upon an MDS, in particular noting that the locations of structures will not be finalised until post-consent. This approach ensures that whatever is constructed will fall within the worst-case parameters already assessed.

15.6 Impact Assessment

15.6.1 Overview

91. This section assesses impacts to shipping and navigation users arising from the Project during the construction, O&M, and decommissioning phases.

15.6.2 Assessment of Impacts applying FSA

15.6.2.1 Impact 1 Displacement of vessels leading to increased collision risk between third party vessels

92. Construction or decommissioning activities and the presence of surface piercing structures within the array area may result in the displacement of vessels from pre-existing routes and activities. This displacement may result in an increased risk of a collision between third-party vessels.
93. During the construction phase, the array area will be marked as a buoyed construction area. There will be no restriction on entry into the buoyed construction area other than through any active safety zones, noting the Cardinal Marks (buoys) do advise Mariners to avoid the area.
94. Experience at other OWF projects indicates that areas of active construction will generally be avoided by vessels observing the buoyed construction area, and therefore it is likely that the ongoing construction works will displace existing traffic from within the array area. The same scenario is likely during the decommissioning phase i.e., the array area will be marked as a buoyed decommissioning area, and it is likely that vessels will avoid the ongoing works.
95. During the operational phase, there would again be no restriction on transits into the array area assuming any active major maintenance safety zones are avoided. However, it is likely that commercial vessels will continue to avoid the array area on the deviations established during the construction phase.
96. During consultation, displacement was raised as a concern by vessel operators including DFDS and Stena. The potential for displacement leading to an increase in collision risk was also raised including by the MCA and the CoS.

15.6.2.2 Commercial Vessels

Commercial Vessel Routeing

97. Based on the deviations assessment undertaken in Volume 3, Appendix 15.1: NRA (document reference 6.3.1.15), of the 13 main commercial routes identified, five are anticipated to deviate to avoid the structures within the array area. The deviations to these four routes are summarised as follows:

- Route 7: one vessel per day. Intersects array area, vessels anticipated to pass to the north post wind farm. Estimated journey distance increase of 0.4nm.
- Route 8: one vessel per day. Intersects array area, vessels anticipated to pass to the west post wind farm. Estimated journey distance increase of 2.4nm.
- Route 9: less than one vessel per day. Intersects array area, vessels anticipated to pass to the north post wind farm. Estimated journey distance increase of 2.6nm.
- Route 12: < 1 vessel per day. Used by DFDS as an adverse weather route. Likely vessels will pass further north (a minor deviation) to increase passing distance from array area. Estimated journey distance increase of 0.2nm.

98. Baseline routeing in the area is observed to be largely dictated by the numerous sand banks and the existing surface piercing infrastructure (both renewables and oil and gas). In the future case scenario routeing of vessels deviating west of the array area will be dictated by the presence of the Outer Dowsing Bank, with these vessels merging with established routes. Vessels deviating to the north will likely pass between the array area and the platforms at the West Sole field (dependent on decommissioning status), again on routes already established by other vessels. It is noted that the changes made to the AfL array area post PEIR to arrive at the array area mean that deviations to vessels passing north have been reduced.

99. The most likely consequences of vessel displacement will be increased journey times and distance for affected third-party vessels. This was highlighted by commercial ferry operators (DFDS and Stena) during consultation. As a worst case, there may be disruption to existing schedules, particularly for the commercial ferry operators using the region. However, given the size of the deviations anticipated and the ability to effectively passage plan, disruptions to schedule are expected to be minimal. DFDS confirmed via the CoS that they were “broadly positive” about the changes made to the array area (email on 12th January 2024).

100. There is not anticipated to be any notable displacement to commercial vessels arising from the ORCPs. The ORCP area has been reduced post PEIR from the ORCP search area to maintain a minimum 0.5nm setback from the commercial routeing to the east. There is searoom available for these vessels to pass further east should they choose to do so, which would lead to a minor deviation.

101. Any displacement associated with the offshore ECC will be temporary and spatially limited to the area around the installation operation. There will be no displacement impact once the cables are laid, other than during any periods of maintenance, which would be anticipated to be a low frequency event.

Collision Risk

102. Historical incident data assessed in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1) indicates that to date no collision incidents between third-party vessels have occurred directly as a result of a UK OWF. However, given vessels will be displaced, it is likely that there will be increased encounters and hence a potential for collision risk to also increase.

103. Based on the quantitative assessment of vessel to vessel collision risk undertaken in in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1), the return period of a vessel being involved in a collision pre wind farm in the shipping and navigation study area was estimated at 31 years, reflective of the traffic volumes in the area. No collisions were identified within the recent incident data assessment undertaken in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1), however it is noted that older data studied at PEIR indicated one collision incident was responded to by the RNLI prior. The collision incident occurred 9nm east of the array area and involved an oil and gas vessel (the data did not specify the other vessel involved).

104. The corresponding post wind farm return period was estimated at 28 years which represents an increase of approximately 12%. The change in collision risk was observed to be primarily associated with routeing to the north and west of the array area. It is noted that this represents a reduction from the equivalent risk estimated at PEIR, a return period of 26 years. This is reflective of the reduction in array area increasing searoom, and minimising collision risk. This aligns with consultation feedback, with the agreed minutes of the second hazard workshop stating that “General consensus by attendees was that concerns have been generally addressed” by the array area reductions.

105. In adverse weather including reduced visibility, third-party vessels may experience limitations regarding visual identification of other third-party vessels, either when passing opposing sides of the buoyed construction/decommissioning areas (with partially constructed or deconstructed WTGs) and operational array area, or when navigating internally within the operational array area (small craft only). These limitations may increase the potential for an encounter. However, this will be mitigated by the application of the COLREGs (including Rule 6 Safe Speeds and Rule 19 Conduct of Vessels in Restricted Visibility) in adverse weather conditions.

106. The most likely consequences in the event of an encounter between two or more third-party vessels is the implementation of avoidance action in line with the COLREGs, with the vessels involved able to resume their respective passages with no long-term consequences.

107. Should an encounter develop into a collision incident, it is most likely to involve minor contact resulting in minor damage to the vessels with no harm to people. As a worst case (with very low frequency of occurrence) one or both of the vessels may experience substantial damage or founder with Potential Loss of Life (PLL) and pollution, with this outcome more likely where one of the vessels is a small craft (e.g., fishing vessel, recreational vessel).

108. Vessel traffic monitoring will be undertaken throughout the construction phase to characterise changes to routeing patterns. These will be compared against the anticipated deviations determined in Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1) to allow a comprehensive review of the mitigation measures applied at the time.

109. Collision risk was also estimated for the ORCP Area Study Area as part of the Volume 3, Appendix 15.1 NRA (document reference 6.3.15.1) modelling process, with a return period of 92 years estimated assuming base case traffic levels. Given limited anticipated impact on deviation to commercial vessels from the ORCP, it is considered unlikely that there will be any associated notable change in collision risk.

Commercial Vessel Third Party Activities

110. As shown via the vessel traffic assessment, dredging and oil and gas activities do take place in the vicinity. Of note is the Outer Dowsing extraction area (area 515/2) located near the south western part of the array area, and various oil and gas platforms, including Malory which is within the array area and is currently still active. Further assessment of third party activities is provided in Volume 1, Chapter 18: Infrastructure and Other Marine Users (document reference 6.1.18).

111. It was estimated that less than one marine aggregate dredger per week intersected the array area based on the long term AIS assessed in Volume 1, Appendix 15.1: NRA (document reference 6.3.15.1). It is considered likely that these vessels would deviate around the array area as opposed to transiting through, though they would be free to transit through assuming active safety zones were avoided. Feedback from Boskalis (a key marine aggregate dredger operator in the area) during the first hazard workshop was that any impact on marine aggregate dredging activity was likely to be minimal given the local dredging areas do not intersect the array area, with feedback indicating marine aggregate dredgers tend to transit from the south and as such significant deviations to vessel transits are also not expected. It was raised at the second hazard workshop that proximity should be considered during the construction phase when safety zones and construction buoyage would be deployed. Appropriate liaison procedures should therefore be put in place with Boskalis, and the presence of area 515/2 will be included in discussions with Trinity House on construction buoyage (noting buoyage locations will be as directed by Trinity House).

112. Given the presence of oil and gas infrastructure within the array area, in particular Malory for which there are no known decommissioning plans, it will be necessary for oil and gas vessels to enter into the array area to access the infrastructure. This has been assessed in the Access and Allision Report (Appendix 18.2; document reference 6.3.18.2).

113. Vessels to the Hornsea projects were observed to typically pass north of the array area and as such no impact is anticipated.

114. As for main commercial routes, the most likely consequence will be increased journey times and distances for affected third-party vessels from the array area, with limited if any deviation expected from the ORCPs.

Promulgation of Information and Passage Planning

115. All vessels operating in the area are expected to comply with national and international flag state regulations (including the COLREGs and SOLAS) and will have a raised level of awareness of construction and decommissioning activities given the promulgation of information relating to the Project. This includes the charting of the buoyed construction/decommissioning area on relevant nautical charts and the use of safety zones. The physical presence of the buoyed construction/decommissioning area itself will also serve to maximise awareness. Similarly, during the operational phase infrastructure will be appropriately marked on relevant nautical charts and by that stage awareness of the array area will be high given its established presence over the construction phase.

116. All vessels proceeding to sea are expected to comply with flag state regulations including Regulation 34 of SOLAS Chapter V – which states that "the voyage plan shall identify a route which […] anticipates all known navigational hazards and adverse weather conditions" (IMO, 1974) – and IMO Resolution A.893(21) on the Guidelines for Voyage Planning (IMO, 1999). The promulgation of information relating to the Project will assist and facilitate such passage planning.

15.6.2.3 Small Craft (Fishing and Recreation)

Small Craft Displacement

117. The vessel traffic survey data shows transits from recreational vessels and fishing vessels through the array area occur (noting the survey captured both AIS and non AIS traffic). This aligns with the findings of the long term AIS analysis within Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).

118. As for commercial vessels, there will be no restriction on small craft entering the array area during any phase other than through active safety zones. However, based on experience at previously under construction OWFs, commercial fishing vessels and recreational vessels may choose not to navigate internally within the buoyed construction/decommissioning area. Therefore, displacement of transits by small craft during the construction and decommissioning phases is also likely to occur.

119. For the operational phase, based on experience at existing operational OWFs, it is anticipated that commercial fishing vessels and recreational vessels may choose to navigate internally within the array area, particularly in favourable weather conditions.

120. Feedback during the first hazard workshop was that the area is commonly used by potters (i.e., vessels laying and hauling static gear pots) in particular (season dependent), and post wind farm use of the area is likely to depend on the final layout noting commercial impacts to fishing vessels are considered in Volume 1, Chapter 14: Commercial Fisheries (document reference 6.1.14). Recreational representation at the workshops indicated no initial concerns; however, it was noted that sailing vessels may be more likely to avoid the array area than motor cruisers.

121. There is unlikely to be notable displacement to small craft associated with the ORCPs, given they will be single isolated platforms, noting that small craft activity in proximity to the ORCP area was not recorded in notable volumes.

122. The most likely consequence of small craft displacement is changes to vessel's existing routines but without any safety impact.

Collision Risk for Small Craft

123. There is anticipated to be an increase in commercial vessel density and hence collision risk around the northern and western wind farm peripheries. Given recreational and fishing transits are known to occur in both these areas based on the vessel traffic survey data, there may be increased encounters between small craft and larger commercial vessels. It is noted that feedback during the first hazard workshop was that recreational vessels would tend to avoid commercial vessel routeing; however, within this area recreational vessels do already transit with commercial vessels in the area between the Outer Dowsing Bank and Triton Knoll OWF. In this regard the Cruising Association noted in the second hazard workshop that the reduction of the western boundary of the AfL array area was a positive for recreational vessels, as it allowed space over the Outer Dowsing Bank for recreational vessels to transit outside of the main commercial routeing through the Outer Dowsing Channel.

124. In the event of a collision incident involving a small craft (with comparatively weaker structural integrity due to hull materials) compared to a larger commercial vessel, the likelihood of a worst case outcome (the small craft foundering with PLL and pollution) will be greater.

15.6.2.4 Embedded Mitigation Measures

125. Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Buoyed construction / decommissioning area;
- Application for safety zones; and
- Lighting and marking.

Significance of Risk

126. The frequency of occurrence, severity of consequence, and significance of risk due to vessel displacement from the array area is presented in Table 15.11 alongside the resulting significance of risk.

Table 15.11: Risk Rankings for displacement of vessels leading to increased collision risk between third party vessels

Project Component	Phase	Frequency	Severity	Significance of Risk
Array Area	Construction	Remote	Serious	Tolerable
	O&M	Remote	Serious	Tolerable
	Decommissioning	Remote	Serious	Tolerable

Project Component	Phase	Frequency	Severity	Significance of Risk
ORCP	Construction	Extremely Unlikely	Serious	Tolerable
	O&M	Extremely Unlikely	Serious	Tolerable
	Decommissioning	Extremely Unlikely	Serious	Tolerable
Offshore ECC	Construction	Extremely Unlikely	Serious	Tolerable
	O&M	Negligible	Serious	Broadly Acceptable
	Decommissioning	Extremely Unlikely	Serious	Tolerable

127. Assuming the additional mitigation of liaison with Boskalis during construction, the impact is assessed as being Tolerable with mitigation and ALARP, and therefore not significant in EIA terms.

15.6.2.5 Impact 2 Restriction of Adverse Weather Routeing

128. The presence of the structures within the array area could restrict adverse weather routeing options in the study area.

129. Adverse weather including wind, wave, and tidal conditions as well as reduced visibility can hinder a vessel's normal route and/or speed of navigation. Adverse weather routes are defined as significant course adjustments to mitigate vessel movement in adverse weather conditions. When transiting in adverse weather conditions, a vessel is likely to encounter various kinds of weather and tidal phenomena, which may lead to severe roll motions, potentially causing damage to cargo, equipment and/or danger to persons on board. The sensitivity of a vessel to these phenomena will depend on the actual stability parameters, hull geometry, vessel type, vessel size and speed.

130. The presence of structures within or near to any adverse weather routes may prevent the route from being utilised during adverse conditions. Mitigations for vessels include adjusting their heading to position themselves 45° to the wind, altering or delaying sailing times, reducing speed and/or potentially cancelling journeys.

All Users

131. DFDS noted during consultation limited concern with the King Seaways and Princess Seaways adverse weather routeing (Route 12), however stated that routeing between Immingham and Cuxhaven would be affected, with a route preferred for use during certain adverse conditions intersecting the array area. This route is used when sea conditions further north are such that the typically used Immingham to Cuxhaven route (Route 7) would require additional time in port to secure cargo i.e., there would be a commercial impact on DFDS if Route 7 could not be used. However, the AfL array area has been reduced post PEIR to arrive at the array area in consultation with DFDS, who have confirmed they are broadly content with the changes made in terms of navigational safety.

132. Due to the nature of being single platforms, the distance to existing vessel routes, and relatively shallow water depths, it is not expected that the ORCPs will have a notable impact on any adverse weather routeing. Similarly for the offshore ECC, any displacement during construction would be temporary and spatially limited to the area around the installation vessel, with no displacement during O&M other than any periods of maintenance.

133. Lighting and marking will be defined in consultation with Trinity House as required, and this will include consideration of requirements during periods of poor visibility (e.g., sound signals) to ensure the structures within the array area and ORCPs are detectable in adverse conditions, noting the structures will also be charted. Under COLREGS (IMO, 1972), vessels are also required to take appropriate measures with regards to determining a safe speed, taking into account various factors including the state of visibility, the state of the wind, sea, and current as well as the proximity of navigational hazards.

134. The most likely consequences are considered to be displacement from existing adverse weather routeing options but with no safety risk. As a worst case, there may be effects on schedules with limited safety risk.

Embedded Mitigation Measures

135. Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information; and
- Lighting and marking.

Significance of Risk

136. The frequency of occurrence, severity of consequence, and significance of risk due to restriction of adverse weather routeing is presented in Table 15.12 alongside the resulting significance of risk.

Table 15.12: Risk Rankings for restriction of adverse weather routeing

Project Component	Phase	Frequency	Severity	Significance of Risk
Array Area	Construction	Remote	Serious	Tolerable
	O&M	Remote	Serious	Tolerable
	Decommissioning	Remote	Serious	Tolerable
ORCP	Construction	Extremely unlikely	Serious	Tolerable
	O&M	Extremely unlikely	Serious	Tolerable
	Decommissioning	Extremely unlikely	Serious	Tolerable
Offshore ECC	Construction	Extremely unlikely	Serious	Tolerable
	O&M	Negligible	Serious	Broadly Acceptable
	Decommissioning	Extremely unlikely	Serious	Tolerable

137. The impact is assessed as being Tolerable and ALARP, and therefore not significant in EIA terms.

15.6.2.6 Impact 3 Increased Vessel-to-Vessel Collision Risk between a Third-Party Vessel and Project Vessel

138. Increases in wind farm vessel activity associated with the Project could lead to increased collision rates in the area with third party vessels.

139. The construction, operation, and decommissioning of the Project will necessitate the use of various types of vessels. These vessels will increase traffic volumes within the area, which may lead to an increase in collision risk to third party vessels.

In Isolation – All Users

140. During construction, it is estimated that up to 174 vessels could be used with a total of up to 5,234 return trips. It is likely that vessel numbers will be similar during the decommissioning phase. During the operational phase up to 2,480 annual trips are estimated. It is likely that some project vessels will be Restricted in Ability to Manoeuvre (RAM), noting that project vessels would likely be undertaking associated sensitive operations activities within the array area, offshore ECC, or at the ORCPs.

141. From historical incident data, there has been one instance of a third-party vessel colliding with a project vessel associated with a UK OWF, leading to moderate vessel damage reported but with no harm to persons. This collision occurred within harbour limits, and therefore was not resultant of project design. It is noted that the incident occurred in 2011, and awareness of OWF developments and the application of the measures has improved or been refined considerably in the interim, with no further collision incidents reported since despite an increase in offshore wind activity and infrastructure.

142. Project traffic movements will be managed via marine coordination for the purposes of ensuring any disruption to third party traffic is minimised. Details of the Project including in relation to vessels will be promulgated meaning areas where increased wind farm vessel traffic will be present are detailed to third party users maximising awareness.

143. Safety zones around structures where active construction/decommissioning and major maintenance works are ongoing will also be applied for to protect both third party and project vessels. Details of authorised safety zones will be promulgated in addition to details of the associated activities, meaning awareness for all third-party users will be maximised.

144. In periods of adverse visibility, third-party vessels may experience limitations regarding visual identification of any Project vessels entering or exiting the buoyed construction/decommissioning areas or array area. However, this will be mitigated by the application of the COLREGs (including Rule 6 Safe Speeds and Rule 19 Conduct of Vessels in Restricted Visibility) in adverse weather conditions and Project vessel compulsory AIS carriage.

145. The most likely consequences in the event of an encounter between a third-party and project vessel is the implementation of avoidance action in line with the COLREGs, with the vessels involved able to resume their respective passages with no long-term consequences.

146. Should an encounter develop into a collision incident, it is most likely to involve minor contact resulting in minor damage to the vessels with no harm to people (as noted in incidents occurred to date as assessed in Volume 2, Appendix 15.1: NRA). As a worst case, one of the vessels could founder with PLL and pollution, with this outcome more likely where one of the vessels is a small craft with comparatively weaker structural integrity given hull materials (e.g., fishing vessel, recreational vessel, or CTV).

Embedded Mitigation Measures

147. Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Buoyed construction/decommissioning area;
- Application for safety zones;
- Marine coordination;
- Compliance of project vessels with the international marine regulations including COLREGs and SOLAS; and
- Guard vessel(s) as required by risk assessment.

Significance of Risk

148. The frequency of occurrence, severity of consequence, and significance of risk due to third party to project vessel collision is presented in Table 15.13 alongside the resulting significance of risk.

Table 15.13: Risk rankings for third party to project vessel collision

Project Component	Phase	Frequency	Severity	Significance of Risk
Array Area	Construction	Extremely unlikely	Serious	Tolerable
	O&M	Extremely unlikely	Serious	Tolerable
	Decommissioning	Extremely unlikely	Serious	Tolerable
ORCP	Construction	Extremely unlikely	Serious	Tolerable
	O&M	Extremely unlikely	Serious	Tolerable
	Decommissioning	Extremely unlikely	Serious	Tolerable
Offshore ECC	Construction	Extremely unlikely	Serious	Tolerable
	O&M	Negligible	Serious	Broadly Acceptable
	Decommissioning	Extremely unlikely	Serious	Tolerable

149. The impact is assessed as being Tolerable and ALARP, and therefore not significant in EIA terms.

15.6.2.7 Impact 4 Increased Vessel to Structure Allision Risk

150. The presence of surface piercing structures may result in the creation of a risk of allision for vessels.

In Isolation – All Users

Powered Vessel to Structure Allision Risk

151. From historical incident data (as assessed in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1)), there have been two instances of a third-party vessel alliding with an operational wind farm structure in the UK. These incidents both involved a fishing vessel, with a RNLI lifeboat attending on both occasions.

152. Based on the post wind farm modelling, the base case annual powered vessel to array structure allision risk was estimated at one every 187 years. This is a relatively high return period and is reflective of the high volume of traffic on routes in close proximity to the array area. However, it is noted that the shallows of the Outer Dowsing Bank form a natural separation between the Outer Dowsing Channel traffic and the array area. Its presence may also mean larger vessels may ground prior to making contact with the WTGs.

153. From the post wind farm modelling relative to traffic in proximity to the ORCP, the base case powered vessel to ORCP allision risk was estimated at one every 417 years for the northern array area (noting its proximity to the routeing to the east), and one in 900 for the southern location. The final proposed location of the ORCP(s) will be discussed with the MCA post consent as required under MGN 654 (MCA, 2021).

154. Vessels are expected to comply with national and international flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan a route which minimises risk given the promulgation of information relating to the Project, including the charting of infrastructure on relevant nautical charts.

155. On approach, the operational lighting and marking on the structures will also assist in maximising awareness and project vessels will as required alert a vessel on a closing approach with a structure, noting that Trinity House indicated during consultation that the ORCPs would likely be lit as isolated structures to minimise allision risk. During construction, the array area will be marked as a buoyed construction area, with temporary lighting used to mark individual structures. Pre commissioning safety zones of 50m will also be applied for, again to minimise allision risk prior to operational mitigations becoming active. Similar mitigations are likely to be applied during the decommissioning phase.

156. Should a powered allision incident occur, the consequences will depend on multiple factors including the energy of the contact, structural integrity of the vessel involved, and the sea state at the time of the contact. Small craft including commercial fishing vessels and recreational vessels are considered most vulnerable to the hazard given the potential for a non-steel construction.

157. With considerations for lesson learned the most likely consequences are minor damage with the vessel involved able to resume passage and undertake a full inspection at the next port of call. As a worst case, the vessel may founder leading to PLL and pollution.

Drifting Vessel to Structure Allision

158. A drifting vessel scenario may develop into an allision situation where the vessel is in proximity to a structure and the direction of the wind and/or tide is such as to direct the vessel towards the structure.

159. Based on the post wind farm modelling, the base case annual drifting vessel to array structure allision frequency was estimated at one every 958 years. This is a moderate return period compared to that estimated for other UK wind farm developments, likely due to the peak direction of drift relative to the shape and location of the array area. Again, the shallows of the Outer Dowsing Bank mean any drifting larger vessels transiting the Outer Dowsing Channel may ground prior to making contact with the WTGs.

160. From the post wind farm modelling relative to traffic in proximity to the ORCP, the combined base case drifting vessel (to both ORCP locations) return period was estimated at one every 27,006 years.

161. From historical incident data, there have been no instances of a third-party vessel alliding with an operational wind farm structure in the UK whilst Not Under Command (NUC).

162. In circumstances where a vessel drifts towards a structure, there are actions which the vessel may take to prevent the drift incident developing into an allision situation. Powered vessels may be able to regain power prior to reaching the array area (i.e., by rectifying any fault). Failing this, the vessel's emergency response procedures would be implemented which may include an emergency anchoring event following a check of the relevant nautical charts to ensure the deployment of the anchor will not lead to other risks (such as anchor snagging on a subsea cable), or the use of thrusters (depending on availability and power supply). Water depths in the local area are such that anchoring is likely to be a feasible option (dependent on the vessel).

163. Where the deployment of the anchor is not possible (e.g., for small craft), any project vessels on-site may be able to render assistance in liaison with the MCA and in line with SOLAS obligations (IMO, 1974), noting this would depend on the type and size of the vessels involved. This response will be managed via HMCG and marine coordination, and depends on the type and capability of vessels on site. This would be particularly relevant for sailing vessels relying on metocean conditions for propulsion, noting if the vessel becomes adrift in proximity to a structure there may be limited time to render assistance.

164. Should a drifting allision incident occur, the consequences will be similar to those outlined for a powered allision incident, including the determining factors. However, the speed at which the contact occurs is likely to be lower than for a powered allision, which may lead to reduced severity of consequence.

Internal Vessel to Structure Allision Risk

165. Commercial vessels are not anticipated to navigate internally within the array area and therefore the likelihood of an internal allision risk for commercial vessels is considered negligible. Vessels navigating within the array area are most likely to be small craft (e.g., fishing, recreation).

166. The base case annual fishing vessel to structure allision frequency is at a return period of approximately one every 8.9 years. This return period is reflective of the volume of fishing vessel traffic in the area, both in transit and engaged in fishing activities, and the conservative assumptions made within the modelling process – in particular, it has been assumed that the baseline fishing activity in terms of proximity to the structures will not change. In reality, it is likely that fishing vessels will increase passing distance to the WTGs. Further, most likely consequences are minor based on the incident assessment undertaken in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).

167. Due to the negligible levels of fishing vessel traffic in proximity to the ORCP locations, fishing vessel to ORCP allision frequency was also considered negligible when considering the mitigations in place e.g., lighting and marking.

168. As with any passage, a vessel navigating internally within the array is expected to passage plan in accordance with SOLAS Chapter V (IMO, 1974). The lighting and marking of the structures in the array area as required by Trinity House, MCA and CAA including MGN 654 compliant unique identification marking of structures in an easily identifiable pattern will assist with minimising the risk of a mariner becoming disoriented whilst navigating internally. The layout itself will be agreed with MCA and Trinity House, noting that these discussions will include consideration of surface internal navigation.

169. For recreational vessels under sail navigating internally within the array area, there is also potential for effects such as wind shear, masking and turbulence to occur. From previous studies of offshore wind developments, it has been concluded that WTGs do reduce wind velocity downwind of a WTG (MCA, 2022) but that no negative effects on recreational craft have been reported on the basis of the limited spatial extent of the effect, and its similarity to that experienced when passing a large vessel or close to other large structures (such as bridges) or the coastline. In addition, no practical issues have been raised by recreational users to date when operating in proximity to existing offshore wind developments.

170. An additional allision risk associated with the WTG blades applies for recreational vessels with a mast when navigating internally within the array area. However, the minimum blade tip clearance for the Project of 40m above MSL will be greater than the minimum clearance the RYA recommend for minimising allision risk (RYA, 2019 (a)) and which is also noted in MGN 654 (22m MHWS). The offset between MSL and MHWS is ~2.1m and therefore the minimum blade tip clearance for the Projects will be more than 37m above MHWS.

171. It will also be necessary for oil and gas vessels to enter into the array area to access the relevant oil and gas infrastructure, most notably the Malory platform (assuming that it remains in active production at the point of the construction of the Project). Suitable access within the layout will be discussed with the relevant operators, and has been assessed in document reference 6.3.18.2.

172. Should an internal allision incident occur, the consequences will be similar to those outlined for a powered allision incident, including the determining factors. However, as with a drifting allision incident, the speed at which the contact occurs will likely be lower than for an external powered allision, given vessels within the array area are likely to be transiting at lower speeds than when in open water.

Embedded Mitigation Measures

173. Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Compliance with MGN 654 (MCA, 2021) and its annexes;
- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Buoyed construction / decommissioning area;
- Application for safety zones;
- Lighting and marking;
- Blade clearance in excess of RYA and MCA requirements; and
- Compliance of project vessels with the international marine regulations including COLREGs and SOLAS.

Significance of Risk

174. The frequency of occurrence, severity of consequence, and significance of risk due to vessel allision is presented in Table 15.14 alongside the resulting significance of risk.

Table 15.14: Risk rankings for vessel to structure allision risk

Project Component	Phase	Frequency	Severity	Significance of Risk
Array Area	Construction	Extremely unlikely	Serious	Tolerable
	O&M	Extremely unlikely	Serious	Tolerable
	Decommissioning	Extremely unlikely	Serious	Tolerable
ORCP	Construction	Extremely unlikely	Serious	Tolerable
	O&M	Extremely unlikely	Serious	Tolerable
	Decommissioning	Extremely unlikely	Serious	Tolerable
Offshore ECC	Construction	No pathway		
	O&M			
	Decommissioning			

175. The impact is assessed as being Tolerable and ALARP, and therefore not significant in EIA terms.

15.6.2.8 Impact 5 Reduction of emergency response provision including SAR capability

176. The presence of structures within the array area and associated vessel activities may result in an increased likelihood of an incident occurring which requires an emergency response and may reduce access for surface and air SAR assets.

Emergency Response Resources

177. During construction, it is estimated that up to 136 vessels could be used with a total of up to 5,128 return trips. It is likely that vessel numbers will be similar during the decommissioning phase. During the operational phase up to 2,480 annual trips are estimated. These vessels will increase the likelihood of an incident requiring an emergency response and subsequently increase the likelihood of multiple incidents occurring simultaneously, diminishing emergency response capability.

178. Based on the incident data studied, baseline incident rates are low in proximity to the array area, reflective of the distance offshore. Additionally, based on the number of collision and allision incidents associated with UK OWFs reported to date (as assessed in Volume 2, Appendix 15.1: NRA), there is an average of one incident per 1,739 operational WTG years (as of December 2023). Therefore, the Project itself is not expected to result in a marked increase in the frequency of incidents requiring an emergency response.

179. Should an incident occur in proximity to the array area, it is likely that a project vessel would be well equipped to assist under SOLAS obligations (IMO, 1974) and in liaison with the MCA, potentially as the first responder. This is reflected in past experience, with 12 known instances of a vessel (or persons on a vessel) being assisted by an industry vessel associated with a nearby UK OWF as detailed in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).

180. The most likely consequences in the event of an incident in the region requiring an emergency response is that emergency responders are able to assist without any limitations on capability. As a worst case, there could be a delay to a response request due to a simultaneous incident associated with the Project leading to PLL, pollution, and vessel damage. However, this worst case scenario is considered highly unlikely.

Search and Rescue Access

181. The physical presence of surface piercing structures may restrict access for SAR responders, either due to the incident in question occurring within the array area or the array area obstructing the most effective path to an incident further offshore. This is more likely to be an issue in periods of adverse weather conditions, noting under such conditions it is likely that SAR helicopters would only enter into the array area from low altitude. Therefore, the Applicant will ensure the associated layout design principles detailed in MGN 654 are applied in consultation with the MCA. An indicative layout has been shown in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1), which is based on a dense perimeter and an inner grid.

182. The assessment of SAR helicopter taskings data indicated that while taskings do occur in the area, the majority are rescue / recovery operations to the local oil and gas infrastructure as opposed to SAR operations (85% of the total were detailed as “Rescue/Recovery”).

183. The Applicant will agree an Emergency Response and Cooperation Plan (ERCoP) with the MCA to ensure appropriate procedures are in place in the event of an emergency incident. A SAR Checklist will also be agreed to ensure any SAR mitigations required by the MCA are implemented for the Project.

184. The final layout and structure identification system will be agreed with both the MCA and Trinity House post consent, with due consideration given to MGN 654 requirements within these discussions.

185. Given the ORCPs will be single isolated platforms, it is considered unlikely that any impact on SAR access will arise.

186. The most likely consequences in the event of a SAR operation is that SAR assets are able to fulfil their objectives without any limitations on capability. As a worst case, it may not be possible to undertake an effective search. However, given that MGN 654 SAR access principles will be applied for the final layout and the layout agreed with the MCA, this is considered highly unlikely.

Embedded Mitigation Measures

187. Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Compliance with MGN 654 (MCA, 2021) and its annexes;
- Marine coordination;
- Layout approval;
- Compliance of project vessels with the international marine regulations including COLREGs and SOLAS; and
- Guard vessel(s) as required by risk assessment.

Significance of Risk

188. The frequency of occurrence, severity of consequence, and significance of risk due to reduction of emergency response provision including SAR capability is presented in Table 15.15 alongside the resulting significance of risk.

Table 15.15: Risk rankings for reduction of emergency response provision including SAR capability

Project Component	Phase	Frequency	Severity	Significance of Risk
Array Area	Construction	Extremely unlikely	Major	Tolerable
	O&M	Extremely unlikely	Major	Tolerable
	Decommissioning	Extremely unlikely	Major	Tolerable
ORCP	Construction	Extremely unlikely	Major	Tolerable
	O&M	Extremely unlikely	Major	Tolerable
	Decommissioning	Extremely unlikely	Major	Tolerable
Offshore ECC	Construction	Extremely unlikely	Major	Tolerable
	O&M	Negligible	Major	Broadly Acceptable

Project Component	Phase	Frequency	Severity	Significance of Risk
	Decommissioning	Extremely unlikely	Major	Tolerable

189. The impact is assessed as being Tolerable and ALARP, and therefore not significant in EIA terms.

15.6.2.9 Impact 6 Reduction of Under Keel Clearance

190. Any changes in under keel clearance as a result of the Project could lead to a risk of under keel interaction to passing vessels.

191. The use of external protection for the cables may be necessary if target burial depths cannot be met. This could lead to reductions in under keel clearance for passing vessels, and potential grounding/interaction risk. The need for and location of any external cable protection will be determined via the cable burial risk assessment which will be undertaken post consent.

192. The maximum height of external protection via rock berm is anticipated to be 1.5m within the offshore ECC, with potentially up to 21.4% of the export cable route requiring protection to be implemented. Maximum height of protection with the array area for the array and interlink cables is also anticipated to be 1.5m, with up to 22.75% and 18.75% potentially requiring protection respectively.

193. As detailed in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1), study of the RYA Coastal Atlas (RYA, 2019 (a)) indicates that the nearshore offshore ECC intersects a "general boating area", which indicates that recreational vessels including those not on AIS may use the area in and around the landfall where water depths are lower and under keel clearance may be of more concern. There are also shallow banks intersecting both the Offshore ECC and array area where water depths are such that a reduction in under keel clearance may represent a navigational hazard.

194. As required under MGN 654 and as detailed within the DCO, the Applicant will consult with the MCA and Trinity House in any instances where water depths are reduced by more than 5% as a result of cable protection to determine whether additional mitigation is necessary to ensure the safety of passing vessels. This aligns with the RYA's recommendation that the "*minimum safe under keel clearance over submerged structures and associated infrastructure should be determined in accordance with the methodology set out in MGN 543* [since superseded by MGN 654]" (RYA, 2019 (a)). This will ensure any areas of shallower water depth where depths are reduced by more than 5% are suitably mitigated.

195. The most likely consequence is a reduction in navigable depths but vessels are still able to transit over the area without contact being made. As a worst case, a vessel may make contact with the cable protection potentially leading to a foundering.

Embedded Mitigation Measures

196. Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Compliance with MGN 654 (MCA, 2021) and its annexes;

- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Cable burial and protection including monitoring; and
- Guard vessel(s) as required by risk assessment.

Significance of Risk

197. The frequency of occurrence, severity of consequence, and significance of risk due to reduction of under keel clearance is presented in Table 15.16 alongside the resulting significance of risk.

Table 15.16 Risk Rankings for Reduction of Under Keel Clearance

Project Component	Phase	Frequency	Severity	Significance of Risk
Array Area	O&M	Extremely unlikely	Moderate	Broadly Acceptable
ORCP	O&M	No pathway		
Offshore ECC	O&M	Extremely unlikely	Moderate	Broadly Acceptable

198. The impact is assessed as being Broadly Acceptable and ALARP, and therefore not significant in EIA terms.

15.6.2.10 Impact 7 Increased anchor/gear interaction risk with subsea cables

199. The presence of subsea cables may result in an interaction risk with anchors or fishing gear.

200. Scenarios that could lead to cable interaction include:

- Vessel dragging anchor over subsea cable following anchor failure;
- Vessel anchoring in an emergency over cable (e.g., to avoid drifting into a structure, of into an area of busy traffic);
- Vessel dropping anchor inadvertently (e.g., mechanical failure); or
- Negligent anchoring (e.g., use of out of date charts, neglecting to raise anchor when departing anchorage).

201. There is also a risk that deployed fishing gear may interact with subsea cables.

All Users – Vessel Anchors

202. The project may utilise up to 377.42km of inter array cables, 123.75km of interlink cables, and 440km of export cable. Burial will be the primary form of protection, with external protection used where identified as necessary via the cable burial risk assessment.

203. There are no charted anchorages in proximity to the offshore ECC; however, instances of anchoring activity were recorded in the nearshore area during the vessel traffic surveys for the ORCP as detailed in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1). In terms of the array area, anchoring activity within the study area was observed to be limited based on the 12 months analysis.

204. Burial depths and the need for any external protection will be determined via the cable burial risk assessment process. This will consider baseline vessel activity including in terms of anchored vessel locations, general traffic volumes, and vessel size and type to determine potential anchor sizes. Protection will also be monitored to ensure it remains an effective mitigation.

205. All cables will be charted on appropriate charts meaning mariners are aware of their presence. In any anchoring scenario, an interaction risk exists only where the anchoring occurs in proximity to a subsea cable and it is anticipated that the charting of infrastructure will inform any decision to anchor, as per Regulation 34 of SOLAS (IMO, 1974).

206. The most likely consequences in the event of a vessel anchoring over a subsea cable is that no interaction occurs given the protection applied to the cable (by burial or other means). Should an interaction occur, historical incident data suggests that the consequences would be negligible, with no damage caused to the vessel or cable. As a worst case, a snagging incident could occur to a small vessel with damaged caused to the anchor and/or the cable, compromising the stability of the vessel.

Fishing Vessels – Gear

207. As for vessel anchors, there is a risk that fishing gear may interact with subsea cables. It is the responsibility of the fishermen to dynamically risk assess whether it is safe to undertake fishing activities within the array area and to make a decision as to whether or not to fish. This decision will be informed by a number of factors, which will include the charted locations of subsea cables. Input received during consultation was that potting activity may continue in the array dependent on the layout (which would be limited concern from a cable interaction perspective). However, the presence of subsea cables and the wind farm structures may mean that trawling is less likely within the array area.

208. Fishermen will similarly be required to take account of the charted presence of subsea cables within the offshore ECC.

209. Active fishing activity is considered further in Volume 1, Chapter 14: Commercial Fisheries (document reference 6.1.14).

Embedded Mitigation Measures

210. Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Compliance with MGN 654 (MCA, 2021) and its annexes;
- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Buoyed construction/decommissioning area;
- Cable burial and protection including monitoring; and
- Guard vessel(s) as required by risk assessment.

Significance of Risk

211. The frequency of occurrence, severity of consequence, and significance of risk due to potential anchor/gear interaction risk is presented in Table 15.17 alongside the resulting significance of risk.

Table 15.17 Risk Rankings for Increased anchor/gear interaction risk with subsea cables

Project Component	Phase	Frequency	Severity	Significance of Risk
Array Area	O&M	Extremely unlikely	Moderate	Broadly Acceptable
ORCP	O&M	No pathway		
Offshore ECC	O&M	Extremely unlikely	Moderate	Broadly Acceptable

212. The impact is assessed as being Broadly Acceptable and ALARP, and therefore not significant in EIA terms.

15.6.3 ANS

213. As per Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1) and Section 15.3, based on assessment of long term AIS data, an area of the southern ANS is intersected by a vessel route that passes between the Broken Bank and Well Bank to the south. The presence of these banks and local oil and gas platforms mean there is limited room for this route to deviate, and as such the Applicant has committed to not siting any ANSs in the area intersecting that route for placement of an ANS, plus a 0.5nm setback (Figure 13.2 of Volume 3, Appendix 15.1: NRA).

214. Once locations have been selected within the remaining southern ANS area and/or the northern ANS area, an NRA process will be undertaken on the selected locations. This will include full baseline assessment, vessel traffic assessment, allision and collision modelling, consultation, and cumulative assessment. The final locations will be subject to approval from the MCA and Trinity House as part of this process to ensure hazards to shipping and navigation are ALARP, and therefore not significant in EIA terms.

15.7 Cumulative Impact Assessment

215. The overarching cumulative impact assessment has been undertaken in accordance with the methodology provided in Volume 1, Annex 5.1: Cumulative Impact Assessment Methodology (document reference 6.3.5.1). Shipping and navigation represents a unique topic due to the nature of vessel routeing spanning a wide spatial area, and as such a bespoke tiering system has been applied as detailed in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).

216. The projects and plans selected as relevant to the assessment of impacts to shipping and navigation are based upon an initial screening exercise undertaken on a long list. Each has been considered and scoped in or out on the basis of potential for interaction with main routeing, data confidence, project status and the distance from the array area. This process is summarised in Table 15.18 which shows the projects screened in via Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1). It is noted that developments that are either under construction or operational are considered as part of the baseline.

Table 15.18 Projects considered within the shipping and navigation cumulative assessment

Development type	Project	Status	Data confidence assessment/phase	Tier
OWF	Dudgeon Extension	Determination	Medium	1
	Sheringham Shoal Extension	Determination	Medium	1
	Hornsea Four	Consented	High	1
	Norfolk Vanguard West	Consented	High	1
	Hornsea Three	Consented	High	1
	Dogger Bank South	Scoped	Medium	2
Carbon Capture Storage	Southern North Sea 3	Licensing Round Area	Low	2
	Southern North Sea 6	Licensing Round Area	Low	2

217. The cumulative MDS for the Project is outlined in Table 15.19. Impacts associated with anchor interaction and underkeel clearance have been screened out of cumulative basis given their localised nature.

Table 15.19 Cumulative MDS

Impact	Scenario	Justification
Cumulative Displacement of vessels leading to increased collision risk between third party vessels	Project plus other Tier 1/2 OWFs / developments.	Cumulative projects may lead to increased cumulative deviations.
Restrictions of Adverse Weather Routeing		Cumulative projects may lead to increased restriction of adverse weather routeing options.
Cumulative Increased vessel-to-vessel collision risk between a third-party vessel and project vessel		Cumulative projects will lead to increased volumes of wind farm vessel traffic.
Cumulative increased vessel to structure allision risk		Cumulative projects may lead to increased cumulative allision risk.
Cumulative reduction of emergency response provision including SAR capability.		Cumulative projects may lead to increased cumulative reduction of emergency response provision including SAR capability.

15.7.1 Cumulative Displacement of vessels leading to increased collision risk between third party vessels

218. Construction or decommissioning activities and the presence of surface piercing structures within the array area in combination with other cumulative developments may result in the displacement of vessels from pre-existing routes and activities. This displacement may result in an increased cumulative risk of a collision between third-party vessels.

15.7.1.1 All Users

Tier 1

219. Cumulative displacement was raised as a key concern by DFDS during consultation, in particular associated with cumulative effects of the Project and Hornsea Three on routeing between Immingham and Cuxhaven. Input from DFDS was that the associated vessels would likely go north of the AfL array area and south of Hornsea Three leading to increased transit distance and time on a cumulative basis. Based on the feedback received, the northern array area boundary has been reduced, leading to increased searoom and lower deviations. DFDS have confirmed they are "broadly positive" with the changes made (email sent via the CoS on the 12th January 2024) as detailed in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1). There is considered to be suitable sea room to safely accommodate the DFDS routeing (noting that the vessels will also need to account for local oil and gas infrastructure); however, there will be a commercial impact, albeit less so following the array area reductions.

220. For vessels anticipated to pass west of the array area (i.e., through the Outer Dowsing Channel between the Outer Dowsing bank and Triton Knoll), there may be cumulative displacement and collision risk associated with the Dudgeon and Sheringham Shoal Extensions to the south. However, based on the post wind farm routeing assessment this is not expected to represent a large increase in traffic volume when compared against baseline numbers already using these routes.

221. Certain main routes were observed to interact with both the array area and Norfolk Vanguard West. Vessels on routes interacting with Norfolk Vanguard West may deviate into the DR1 DWR, however this is likely regardless of the presence of the Project.

Tier 2

222. No main routes identified in the study area interact with Dogger Bank South, and as such there is not considered to be an associated cumulative impact.

223. Any cumulative displacement associated with the screened in carbon capture developments will be temporary i.e., limited to periods when surface activity is occurring, and spatially limited to the area around the operation.

15.7.1.2 Embedded Mitigation Measures

224. Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Buoyed construction/decommissioning area;

- Application for safety zones; and
- Lighting and marking.

15.7.1.3 Significance of Risk

225. The frequency of occurrence, severity of consequence, and significance of risk due to cumulative vessel displacement leading to collision risk is presented in Table 15.20 alongside the resulting significance of risk.

Table 15.20 Cumulative risk rankings for displacement of vessels leading to increased collision risk between third party vessels

Phase	Frequency	Severity	Significance of Risk
Construction	Remote	Serious	Tolerable
O&M	Remote	Serious	Tolerable
Decommissioning	Remote	Serious	Tolerable

226. The impact is assessed as being Tolerable and ALARP, and therefore not significant in EIA terms.

15.7.2 Cumulative Restrictions of Adverse Weather Routeing

227. The presence of the structures within the array area in combination with other cumulative developments could restrict adverse weather routeing options in the study area.

15.7.2.1 All Users

Tier 1

228. DFDS indicated during consultation the key concern associated with adverse weather was in relation to Route 7 between Immingham and Cuxhaven given if the associated vessels deviate north of the AfL array area, there will be a need for increased time in port to secure cargo under certain sea conditions i.e., a commercial impact. The cumulative impact of Hornsea Three will mean there is an additional commercial impact given these vessels would also require increased transit times and distances to deviate north of the array area and south of Hornsea Three. However, there is considered to be sufficient sea space available to accommodate adverse weather transits in terms of navigational safety, and it is noted that DFDS have subsequently confirmed they are “broadly positive” about the array area changes (i.e., from the AfL array area to the array area) to address these concerns made (12th January 2024) as detailed in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).

229. DFDS indicated limited concerns with adverse weather transits for the Newcastle to Amsterdam routeing and adverse weather transits through the Outer Dowsing Channel.

Tier 2

230. No adverse weather routeing identified in the study area interacts with Dogger Bank South, and as such there is not considered to be an associated cumulative impact.

231. Any cumulative displacement associated with the screened in carbon capture developments will be temporary i.e., limited to periods when surface activity is occurring, and spatially limited to the area around the operation. Such operations may also be less likely during periods of adverse weather.

15.7.2.2 Embedded Mitigation Measures

232. Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information; and
- Lighting and marking.

15.7.2.3 Significance of Risk

233. The frequency of occurrence, severity of consequence, and significance of risk due to cumulative restriction of adverse weather routeing is presented in Table 15.21 alongside the resulting significance of risk.

Table 15.21 Cumulative risk rankings for restriction of adverse weather routeing

Phase	Frequency	Severity	Significance of Risk
Construction	Remote	Serious	Tolerable
O&M	Remote	Serious	Tolerable
Decommissioning	Remote	Serious	Tolerable

234. The impact is assessed as being Tolerable and ALARP, and therefore not significant in EIA terms.

15.7.3 Cumulative Increased vessel-to-vessel collision risk between a third-party vessel and project vessel

235. Cumulative increases in wind farm vessel activity associated with the Project including combination with other cumulative developments could lead to increased cumulative collision rates in the area with third party vessels.

15.7.3.1 All Users

Tier 1

236. Vessels routeing to the existing Hornsea projects were identified within the study area transiting from the Humber. It is anticipated that similar routeing may be used for vessels associated with Hornsea Three and Four. Depending on origin port there may also be increased wind farm vessel presence associated with other Tier 1 projects.

237. All wind farm developments are expected to be implementing appropriate vessel management procedures including via marine coordination to ensure any disruption to third party traffic is minimised. It is also expected that all developers will apply for the industry standard safety zones (i.e., similar to what the Project intends to apply for). All project vessels regardless of developer will also be required to comply with COLREGS which will manage encounter situations.

Tier 2

238. Any cumulative impact associated with Dogger Bank South will depend on origin port of the project vessels. However, the same mitigations as for Tier 1 developments would apply to any project vessel transits through the area.

15.7.3.2 Embedded Mitigation Measures

239. Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Buoyed construction/decommissioning area;
- Application for safety zones;
- Marine coordination;
- Compliance of project vessels with the international marine regulations including COLREGs and SOLAS; and
- Guard vessel(s) as required by risk assessment.

15.7.3.3 Significance of Risk

240. The frequency of occurrence, severity of consequence, and significance of risk due to cumulative third party to project vessel collision is presented in Table 15.22 alongside the resulting significance of risk.

Table 15.22: Cumulative risk rankings for third party to project vessel collision

Phase	Frequency	Severity	Significance of Risk
Construction	Extremely Unlikely	Serious	Tolerable
O&M	Extremely Unlikely	Serious	Tolerable
Decommissioning	Extremely Unlikely	Serious	Tolerable

241. The impact is assessed as being Tolerable and ALARP, and therefore not significant in EIA terms.

15.7.4 Cumulative increased vessel to structure allision risk

242. The structures within the array area will create cumulative allision risk to third party passing vessels in combination with other cumulative developments.

15.7.4.1 All Users

Tier 1

243. Allision risk will be localised to individual areas around developments, and there is considered to be sufficient sea space between the array area and Tier 1 developments to mitigate cumulative allision risk. It is noted that the AfL array area reductions made post PEIR (to arrive at the 'array area') have increased searoom further, and consultation feedback has indicated that key consultees are broadly content as set out in Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).

244. All developments will be required to implement lighting and marking in agreement with Trinity House and in line with IALA G1162 (IALA, 2021) and chart structure locations on appropriate nautical charts to ensure the structure positions are clear to passing mariners.

Tier 2

245. There is not considered to be an increase in cumulative allision risk associated with Dogger Bank South based on its distance from the array area, noting that the same mitigations discussed for Tier 1 developments would apply.

15.7.4.2 Embedded Mitigation Measures

246. Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Compliance with MGN 654 (MCA, 2021) and its annexes;
- Appropriate marking on Admiralty charts;
- Promulgation of information;
- Buoyed construction/decommissioning area;
- Application for safety zones;
- Lighting and marking;
- Blade clearance in excess of RYA and MCA requirements; and
- Compliance of project vessels with the international marine regulations including COLREGs and SOLAS.

15.7.4.3 Significance of Risk

247. The frequency of occurrence, severity of consequence, and significance of risk due to cumulative vessel allision risk is presented in Table 15.23 alongside the resulting significance of risk.

Table 15.23: Cumulative risk rankings for vessel to structure allision risk

Phase	Frequency	Severity	Significance of Risk
Construction	Extremely Unlikely	Serious	Tolerable
O&M	Extremely Unlikely	Serious	Tolerable
Decommissioning	Extremely Unlikely	Serious	Tolerable

248. The impact is assessed as being Tolerable and ALARP, and therefore not significant in EIA terms.

15.7.5 Cumulative reduction of emergency response provision including SAR capability

249. The presence of structures within the array area and associated vessel activities may result in a cumulative increased likelihood of an incident occurring which requires an emergency response and may reduce access for surface and air SAR assets.

15.7.5.1 All Users

Tier 1

250. Given generally low baseline incident rates and noting historical incident data indicates limited vessel based incidents associated with wind farms, it is considered unlikely that there will be a notable increase in incidents on a cumulative basis. Furthermore, there will be additional vessel based resources that would be available at other projects which may be able to assist in the event of an incident occurring in the area (depending on the nature of the incident and vessels involved).

251. All developers will be required to comply with MGN 654 in terms of developments of an ERCoP, agreements of a SAR checklist, and approval of the layout by MCA in terms of SAR access. It is also noted that the MCA require cumulative considerations to be captured in the ERCoP.

Tier 2

252. Dogger Bank South is considered analogous to Tier 1 developments with regards to this impact.

15.7.5.2 Embedded Mitigation Measures

253. Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Compliance with MGN 654 (MCA, 2021) and its annexes;
- Marine coordination;
- Layout approval;
- Compliance of project vessels with the international marine regulations including COLREGs and SOLAS; and
- Guard vessel(s) as required by risk assessment.

15.7.5.3 Significance of Risk

254. The frequency of occurrence, severity of consequence, and significance of risk due to cumulative reduction of emergency response provision including SAR capability is presented in Table 15.24 alongside the resulting significance of risk.

Table 15.24: Cumulative risk rankings for reduction of emergency response provision including SAR capability

Phase	Frequency	Severity	Significance of Risk
Construction	Extremely Unlikely	Major	Tolerable
O&M	Extremely Unlikely	Major	Tolerable
Decommissioning	Extremely Unlikely	Major	Tolerable

255. The impact is assessed as being Tolerable and ALARP, and therefore not significant in EIA terms.

15.8 Inter-Relationships

256. Potential effects may arise on receptors from different aspects. For shipping and navigation, the only aspect which could lead to an inter-related effect is commercial fisheries, associated with the displacement of fishing activity due to the presence of the buoyed construction/decommissioning area during construction and decommissioning phases. The displacement of all vessels, including fishing vessels, due to the presence of the buoyed construction/decommissioning area is considered in section 15.6 Impact Assessment. As such, there are no additional inter-related effects beyond those already assessed for shipping and navigation.

15.9 Transboundary Effects

257. Transboundary impacts with regard to vessel routeing including to international ports are considered to have been assessed within the assessments in Sections 15.6 and 15.7. Individual transits may have the potential to be associated with vessels that are internationally owned or located, however such individual transits have been captured and considered as part of the baseline assessment of marine traffic as assessed within Volume 3, Appendix 15.1: NRA (document reference 6.3.15.1).

258. As such no transboundary impacts other than those already assessed are anticipated.

15.10 Conclusions

259. A summary of the FSA is provided in Table 15.25. This includes a statement of significance in EIA terms for each impact.

Table 15.25 Summary of Potential Impacts on shipping and navigation

Description of effect	Effect	Additional mitigation measures	Maximum Residual impact
Construction			
Impact 1 Displacement with effects on schedule and collision incident occurs with	Vessel displacement	Liaison with Boskalis.	Tolerable with Mitigation. Not significant in EIA terms.

Description of effect	Effect	Additional mitigation measures	Maximum Residual impact
vessel damage, PLL, and/or pollution.			
Impact 2 Restriction of Adverse Weather Routeing	Restriction of Adverse Weather Routeing	n/a	Tolerable. Not significant in EIA terms.
Impact 3 Increased vessel-to-vessel collision risk between a third-party vessel and project vessel	Vessel collision	n/a	Tolerable. Not significant in EIA terms.
Impact 4 Increased vessel to structure allision risk	Vessel allision	n/a	Tolerable. Not significant in EIA terms.
Impact 5 Reduction of emergency response provision including SAR capability.	Reduction of emergency response provision	n/a	Tolerable. Not significant in EIA terms.
Operation and Maintenance			
Impact 1 Displacement with effects on schedule and collision incident occurs with vessel damage, PLL, and/or pollution.	Vessel displacement	n/a	Tolerable. Not significant in EIA terms.
Impact 2 Restriction of Adverse Weather Routeing	Restriction of Adverse Weather Routeing	n/a	Tolerable. Not significant in EIA terms.
Impact 3 Increased vessel-to-vessel collision risk between a third-party vessel and project vessel	Vessel collision	n/a	Tolerable. Not significant in EIA terms.
Impact 4 Increased vessel to structure allision risk	Vessel allision	n/a	Tolerable. Not significant in EIA terms.
Impact 5 Reduction of emergency response provision including SAR capability.	Reduction of emergency response provision	n/a	Tolerable. Not significant in EIA terms.

Description of effect	Effect	Additional mitigation measures	Maximum Residual impact
Impact 6 Reduction of under keel clearance	Reduction of under keel clearance	n/a	Broadly Acceptable Not significant in EIA terms.
Impact 7 Increased anchor / gear interaction risk with subsea cables.	Increased anchor / gear interaction risk	n/a	Broadly Acceptable Not significant in EIA terms.
Decommissioning			
Impact 1 Displacement with effects on schedule and collision incident occurs with vessel damage, PLL, and/or pollution.	Vessel displacement	n/a	Tolerable. Not significant in EIA terms.
Impact 2 Restriction of Adverse Weather Routeing	Restriction of Adverse Weather Routeing	n/a	Tolerable. Not significant in EIA terms.
Impact 3 Increased vessel-to-vessel collision risk between a third-party vessel and project vessel	Vessel collision	n/a	Tolerable. Not significant in EIA terms.
Impact 4 Increased vessel to structure allision risk	Vessel allision	n/a	Tolerable. Not significant in EIA terms.
Impact 5 Reduction of emergency response provision including SAR capability.	Reduction of emergency response provision	n/a	Tolerable. Not significant in EIA terms.
Cumulative			
Impact 1 Displacement with effects on schedule and collision incident occurs with vessel damage, PLL, and/or pollution.	Vessel displacement	n/a	Tolerable. Not significant in EIA terms.
Impact 2 Restriction of Adverse Weather Routeing	Restriction of Adverse Weather Routeing	n/a	Tolerable.

Description of effect	Effect	Additional mitigation measures	Maximum Residual impact
			Not significant in EIA terms.
Impact 3 Increased vessel-to-vessel collision risk between a third-party vessel and project vessel	Vessel collision	n/a	Tolerable. Not significant in EIA terms.
Impact 4 Increased vessel to structure allision risk	Vessel allision	n/a	Tolerable. Not significant in EIA terms.
Impact 5 Reduction of emergency response provision including SAR capability.	Reduction of emergency response provision	n/a	Tolerable. Not significant in EIA terms.

15.11 References

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